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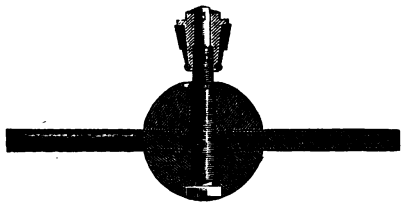

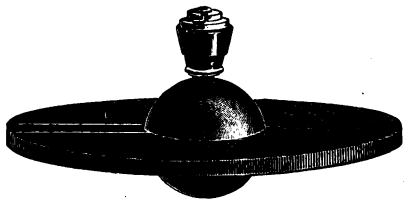

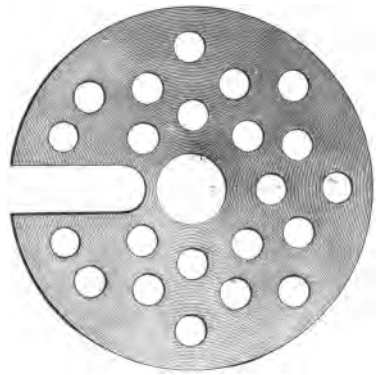

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PROCEEDINGS

OF THE

TWELFTH ANNUAL CONVENTION

OF THE

American Society

OF

Municipal Improvements

HELD AT

MONTREAL, CAN., SEPT. 5, 6, 7 AND 8,

1905

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THE NEXT MEETING WILL BE HELD AT BIRMINGHAM, ALA.

American Society of Municipal Improvements

OFFICERS

1905-1906

President	C. C. BROWN	Indianapolis, Ind.
First Vice-President	JOHN R. BARLOW	Montreal, Canada.
Second Vice-President	JAS. OWEN	Montclair, N. J.
Third Vice-President	JULIAN KENDRICK	Birmingham, Ala.
Secretary	GEO. W. TILLSON	Brooklyn, N. Y.
Treasurer	F. J. O'BRIEN	Oswego, N. Y.

FINANCE COMMITTEE

E. S. BARROW, Chairman	Hamilton, Ont.
A. F. EGGERS	Newark, N. J.
FRED GIDDINGS	Atchison, Kan.

EXECUTIVE COMMITTEE

The officers of this Society, together with the Past Presidents who have retained their continuous membership, constitute the Executive Committee. The Past Presidents are as follows:

PAST PRESIDENTS

M. J. MURPHY	St. Louis, Mo.
GEO. H. BENZENBERG	Milwaukee, Wis.
AUG. HERRMANN	Cincinnati, Ohio.
HARRISON VAN DUYNE	Newark, N. J.
NELSON P. LEWIS	Brooklyn, N. Y.
A. D. THOMPSON	Peoria, Ill.
ROBERT E. McMATH	St. Louis, Mo.
E. A. FISHER	Rochester, N. Y.
C. H. RUST	Toronto, Canada.
GEO. M. BALLARD	Newark, N. J.
A. PRESCOTT FOLWELL	Easton, Pa.

Standing Committees

Appointed by the President in accordance with Article IV, Section 4, of the Constitution of the Society.

1905-1906

STREET PAVING

JAMES OWEN, Chairman.....Newark, N. J.
J. W. HOWARD.....New York City.
E. A. HARPER.....Kansas City, Mo.

ELECTRIC STREET LIGHTING

A. PARENT, Chairman.....Montreal, Canada.
HENRY S. BAKER.....Watertown, N. Y.
E. A. FISHER.....Rochester, N. Y.

SEWERAGE AND SANITATION

J. N. HAZLEHURST, Chairman.....Mobile, Ala.
W. H. LUSTER.....Elizabeth, N. J.
WILLIAM H. FLOYD.....St. Joseph, Mo.

WATER WORKS AND WATER SUPPLY

JULIAN GRIGGS, Chairman.....Columbus, Ohio.
U. E. TAUBENHEIM.....Archangel, Russia.
G. H. BENZENBERG.....Milwaukee, Wis.

TAXATION AND ASSESSMENT

WILLIAM S. CRANDALL, Chairman.....New York City.
CHARLES H. RUST.....Toronto, Ont.
WILLIAM FORTUNE.....Indianapolis, Ind.

CITY GOVERNMENT AND LEGISLATION

THOMAS NEVILLE, Chairman.....Rochester, N. Y.
JULIAN KENDRICK.....Birmingham, Ala.
N. I. KER.....Ottawa, Canada.

DISPOSITION OF GARBAGE AND STREET CLEANING

T. C. HATTON, Chairman.....Wilmington, Del.
HOWARD C. BAYLES.....New York City.
JOHN R. BARLOW.....Montreal, Can.

MUNICIPAL FRANCHISES

INSPECTOR OF GAS, Chairman.....Cincinnati, O.
CHAS. H. RUST.....Toronto, Ont.
E. S. BARROW.....Hamilton, Ont.

REVIEW

A. PRESCOTT FOLWELL, Chairman.....Easton, Pa.
THOMAS D. ALLIN.....Pasadena, Cal.
J. M. HAMELL.....Hull, Quebec.

Special Committees

Appointed by the President in accordance with resolutions adopted by the Society.

MUNICIPAL DATA AND STATISTICS

HUGO S. GROSSER, Chairman.....Chicago, Ill.
H. N. RUTTAN.....Winnipeg, Manitoba.
H. W. WILMOT.....New York City.

PARK DEVELOPMENT AND MAINTENANCE

G. A. PARKER, Chairman (Supt. Keney Park).....Hartford, Conn.
JOHN McLAREN.....San Francisco, Cal.
FRANK FOSTER.....Chicago, Ill.

FIRE PROTECTION

ALCIDE CHAUSSE, Chairman.....Montreal, Can.
PETER PROVOST.....Ottawa, Can.
JOHN E. GRIFFITH.....Brooklyn, N. Y.

EXHIBITS FOR NEXT MEETING

WM. S. CRANDALL.....New York, N. Y.
R. K. DAVIS.....Detroit, Mich.
E. J. SNOW.....Brooklyn, N. Y.
T. H. BLAIR.....Northboro, Mass.
GEO. W. TILLSON.....Brooklyn, N. Y.
M. R. SHERRERD.....Newark, N. J.
C. H. RUST.....Toronto, Canada.

NOTICE

The Annual Reports for the former meetings are for sale by the Secretary at the following prices, including postage:

1895	$ .25	1901	$1.00
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GEO. W. TILLSON,
Municipal Building,
Brooklyn, N. Y.

AMERICAN SOCIETY

OF

MUNICIPAL IMPROVEMENTS

CONSTITUTION OF THE SOCIETY

ARTICLE I—NAME AND OBJECT.

Section 1. The objects of this Society, which shall be known as "The American Society of Municipal Improvements," shall be to disseminate information and experience upon, and to promote the best methods to be employed in the management of municipal departments, and in the construction of municipal works, by means of annual conventions, the reading and discussion of papers upon Municipal Improvements, and by social and friendly intercourse at such conventions, and to circulate among its members, by means of an annual publication, the information thus obtained.

ARTICLE II—MEMBERSHIP.

Section 1. Any municipality within America shall be eligible to membership in this Society; likewise any engineer, officer, or director who shall have charge of or supervision over or be employed as a consulting engineer on any public or municipal department work.

Any member who shall have ceased to have charge or supervision of any public or municipal department or work may retain his membership, unless he shall have come under the restrictive requirements of associate membership, when he shall retain membership as an associate only.

Sec. 2. Every application for membership shall be in writing, stating the name, location and department, if any; and, if of an individual, shall also state age, residence and position of the applicant, if any.

Sec. 3. Any proper person interested in municipal improvements or work as a contractor or contracting agent or who is a manufacturer or dealer in municipal supplies, may become an associate member, who shall enjoy all the rights and privileges of full membership, excepting that of holding office or voting.

Sec. 4. Any member who shall be in arrears for more than one year's dues shall be considered as no longer a member of this Society, and his name shall be discontinued from the roll by the Secretary.

Sec. 5. Any member may withdraw from the Society upon payment of all dues to date, and by notifying the Secretary thereof in writing.

Sec. 6. Any member may be expelled from the Society upon the recommendation of the Executive Committee adopted by a two-thirds vote of all the members present.

ARTICLE III—Fees and Dues.

Section 1. Each corporate member shall pay five dollars per annum, and each associate member shall pay ten dollars per annum. All dues to be payable in advance, on or before the date of the annual meeting.

ARTICLE IV—Officers.

Section 1. The officers of this Society shall consist of a President, three Vice-Presidents, a Secretary, and a Treasurer, not more than two of whom shall be a resident of the same state, and who with the Past Presidents who have retained their continuous membership shall act as an Executive Committee for and in behalf of the Society.

Sec. 2. There shall also be elected a Finance Committee consisting of three members of the Society.

Sec. 3. In case of any of the above positions, excepting the presidency, becoming vacant, or in case of their absence during the annual convention, the President shall fill such vacancy by appointment from the membership.

Sec. 4. There shall be appointed annually the following standing committees:

1. Street-Paving.
2. Electric Street-Lighting.
3. Sewerage and Sanitation.
4. Waterworks and Water-Supply.
5. Taxation and Assessments.
6. City Government and Legislation.
7. Disposition of Garbage and Street Cleaning.
8. Review.
9. Municipal Franchises.

The number of each committee shall be three, and the Chairman may add such names as he may deem advisable. No special or standing committee shall be authorized to create any liabilities unless the same shall have been first approved by the Executive Committee.

ARTICLE V—Election.

Section 1. The officers of this Society shall be elected by ballot on the second day of each annual convention, and each municipality shall be entitled to as many votes as it has representatives present.

Sec. 2. The President shall not be eligible for immediate re-election (except by a unanimous vote).

Sec. 3. The officers elected shall assume office immediately after the close of the annual meeting at which they were elected.

Sec. 4. The ballot for any officer may be waived by unanimous consent.

ARTICLE VI—Duties.

Section 1. The President shall preside at the meetings of the Society and at those of the Executive Committee, and shall perform such other duties as are incumbent upon the office. In the absence of the President, or upon his becoming ineligible, the senior Vice-President shall assume and perform the duties of the office.

Sec. 2. The Secretary shall keep accurate minutes of the proceedings of the Society and of the Executive Committee; shall conduct all correspondence; shall issue notices of any meeting of the Society not less than four weeks prior to the date of such meeting; shall collect and receipt for all fees and dues and pay them to the Treasurer quarterly, taking his receipt for the same; and keep accurate account between the Society and its members.

Sec. 3. The Treasurer shall receive from the Secretary and safely keep all moneys belonging to the Society, giving his receipt therefor; shall pay all bills approved by the Finance Committee or the President; shall keep correct account of the funds of the Society, and submit to it at its annual meeting a report of all receipts and disbursements during the preceding year.

Sec. 4. The Executive Committee shall manage all the affairs of the Society, subject to the action and approval of the Society at its meeting. All questions in Executive Committee shall be decided by a majority vote, and five members shall constitute a quorum, not less than four of whom shall be officers of the Society. The Executive Committee shall meet at least once each year, on the morning of the first day of the annual meeting of the Society, and as much oftener as the President may determine. The Executive Committee shall be directed to keep an accurate list of the members of the Society, and to ascertain from time to time whether or not such members are still municipal officers, and if not, to take such steps as may be necessary to secure new members from such cities in which members of the Society are no longer municipal officers—this with a view of insuring the permanency of the association, as well as maintaining and increasing the membership thereof.

Sec. 5. The Finance Committee shall meet on the morning of the first day, and previous to the annual meeting of the Society, to examine and audit the Secretary's and Treasurer's accounts and annual statements, and report thereon to the Society.

Sec. 6. It shall be the duty of the Chairman of each standing committee to prepare a report, with the aid of his fellow-committeemen, and submit the same at the annual meeting.

Sec. 7. One afternoon, and such other time as may be deemed necessary, shall be devoted to sectional work, the Chairman of each standing committee acting as Chairman of the section. The Chairman of each section shall arrange the program of the sectional meetings in connection with the Program Committee of the Society.

ARTICLE VII—MEETINGS.

Section 1. The annual meeting of the Society shall be held on the second Wednesday in October of each year, in such city as the majority of the members voting shall decide. Selection of place of meeting to be made after the officers shall have been elected. Provided, however, that the date may be changed for cause, with the approval of two-thirds of the Executive Committee, all the members to be notified of such change in accordance with Article VI, Section 2.

Sec. 2. At any annual meeting of the Society twenty members shall constitute a quorum for the transaction of business.

Sec. 3. Any member, with the concurrence of the presiding officer, may admit friends to the meeting of the Society, but such person or persons shall not without the consent of the meeting be permitted to take part in any discussion.

Sec. 4. All papers, drawings, etc., submitted to the meeting of the Society shall be and remain the property of the Society.

ARTICLE VIII—ORDER OF BUSINESS.

Section 1. At the annual meeting of the Society the order of business shall be as follows:

1. Roll call.
2. Reading of minutes of last meeting.
3. Considering of applications for membership.
4. The President's address.
5. Reports of the Secretary and Treasurer.
6. Report of the Executive Committee.
7. Report of the Finance Committee.
8. Report of special committees.
9. Reading and discussion of papers.
10. Election of officers.
11. Selection next place of meeting.
12. General business.

Sec. 2. All questions shall be decided by vote, and all differences of opinion in regard to points of order shall be settled by parliamentary practice as set forth in Cushing's Manual.

ARTICLE IX—AMENDMENTS.

Section 1. The foregoing constitution and articles may be amended on or after the second day of any annual meeting of the Society by a two-thirds vote of all members voting; provided such proposed amendment shall have been submitted to the Society in writing on the first day of its annual meeting.

BY-LAWS

No. 1. Members shall not be permitted to give out for publication any papers, to be submitted to the Society at its annual meeting, in advance of such meetings; and all requests for papers for such purposes shall be referred to the Secretary.

No. 2. All committees and members of the Society shall be required to furnish four copies of all reports, papers or other matters submitted to the Society for its consideration.

No. 3. It shall be the duty of the President, on or before the 1st day of January of each year, to divide America by States into Territorial Sections, and to assign one or more members of the Executive Committee to each of said sections. It shall be the duty of the members of the Executive Committee thus assigned to keep an accurate list of the municipalities and members of the Society in the particular territory assigned to them, and to ascertain, from time to time, whether or not the members of the Society from the territory assigned to them are still municipal officers; and when not, to take such steps as may be necessary to secure new members from such municipalities, as well as to secure membership in the Society of such municipalities and officials in the territory assigned to them that have not acquired the same in the past.

No. 4. The President shall be required, at least sixty days before the holding of the annual convention, to communicate with the local committee having charge of the arrangements of the convention in the city in which the same is to be held, with a view of securing exact data as to place of meeting, entertainment to be furnished, hotel and railroad rates, etc., and to print this information, together with such data relating to the business of the convention as he may have, and turn the same over to the Secretary, or members of the Executive Committee, for distribution.

LIST OF MEMBERS

CORPORATE MEMBERS

Ackerman, J. Walter, City Engineer, Auburn, N. Y.
Allen, C. R., Jr., City Engineer, Barre, Vt.
Allin, Thos. D., City Engineer, Pasadena, Cal.
Alvord, John W., Consulting Engineer, 127 Hartford Bldg., Chicago, Ill
Anderson, L. W., City Engineer, Grand Rapids, Mich.
Andrews, Horace, 125 Lancaster St., Albany, N. Y.
Arthur, William H., Superintendent of Public Works, Stamford, Conn.

Baker, Henry E., City Engineer, Watertown, N. Y.
Ballard, Geo. M., Chairman Water Committee, Newark, N. J.
Barlow, John R., City Engineer, Montreal, Canada.
Barr, J. Carroll, Economy, Pa.
Barrow, E. S., City Engineer, Hamilton, Ont.
Bauman C. V., Street Committee, Newark, N. J.
Bayles, Howard G., Consulting Engineer, 37 W. 34th St., New York City.
Benzenberg, Geo. H., Consulting Engineer, 436 Jefferson St., Milwaukee, Wis.
Berry, George, Assistant Engineer, Bureau of Highways, Borough of Brooklyn, N. Y.
Blair, Bryce R., City Engineer, Carbondale, Pa.
Boley, C. U., Engineer, Sheboygan, Wis.
Bragg, Harry, Editor Canadian Municipal Journal, Montreal, Canada.
Breen, J. E., Chief Engineer, Board of Public Service, Cincinnati, O.
Briggs, B. E., City Engineer, Erie, Pa.
Brown, Charles C., Editor Municipal Engineering, Indianapolis, Ind.
Brown, C. W., City Clerk, Winnipeg, Man.

Cappelen, F. W., 702 Oneida Block, Minneapolis, Minn.
Carpenter, George A., City Engineer, Pawtucket, R. I.
Case, E. W., City Engineer, Colorado Springs, Colo.
Chairman of Municipal Council, St. Johns, Newfoundland.
Chausse, Alcide, Building Inspector, Montreal, Can.
Christy, L. V., Secretary Street and Sewer Dept., Wilmington, Del
Clark, Alfred, Commissioner of Highways, Concord, N. H.
Crandall, Wm. S., Room 420, 253 Broadway, New York City.

Dalrymple, F. W., City Engineer, Bayonne, N. J.
Devereux, Harry H., Mayor, Springfield, Ill.

Easby, Wm. Jr., Asst. Professor of Civil Engineering, College Hall, University of Pennsylvania, Phildelphia, Pa.
Eggers, Augustus F., Board of Works, Newark, N. J.

Fendall, Benj. T., City Engineer, Baltimore, Md.
Fisher, E. A., City Engineer, Rochester, N. Y.
Floyd, William H., Jr., City Engineer, St. Joseph, Mo.
Folwell, A. Prescott, Consulting Engineer, Easton, Pa.
Fort, E. J., Assistant Engineer, Bureau of Highways, Borough of Brooklyn, N. Y.
Fortune, Wm., Publisher Municipal Engineering, Indianapolis, Ind.
Freiberg, M. J., Waterworks Commission, 216 E. Front St., Cincinnati, O.
Freshney, S. A., Secretary and General Manager, Board of Public Works, Grand Rapids, Mich.

Giddings, Fred, City Engineer, Atchison, Kan.
Glore, W. H., Superintendent Waterworks, Covington, Ky.
Goodell John M., Editor Engineering Record, 114 Liberty St., New York.
Greathead, Wm. E., Clerk Board of Public Works, Newark, N. J.
Griffith, John E., Assistant Engineer, Dep't of Water Supply, Borough of Brooklyn, N. Y.
Griggs, Julian, Engineer, Dept. of Public Works, Columbus, O.
Grosser, Hugh S., City Statistician, 207 City Hall, Chicago, Ill.

Hamell, J. M., City Engineer, Hull, Que.
Hamilton, Frank H., City Engineer, Springfield, Ill.
Harper, E. A., City Engineer, Kansas City, Mo.
Hatton, T. Chalkley, City Engineer Street and Sewer Dept., Wilmington, Del.
Hazelhurst, J. N., Engineer Board of Public Works, Mobile, Ala.
Herrman, August, President Waterworks Commissioners, Cincinnati, O.
Holloway, C. M., Waterworks Commissioner, Cincinnati, O.
Howard, J. W., Consulting Engineer, No. 1 Broadway, New York, N. Y.
Howe, W. B., City Engineer, Concord, N. H.

Johnson, Edward J., City Engineer, Nashua, N. H.
Johnston, A. L., Sewer Department, Wilmington, Del.
Jones, John, Superintendent of Streets, Toronto, Ont.
Judson, William Pierson, Broadalpin, Fulton Co., N. Y.

Kendrick, Julian, City Engineer, Birmingham, Ala.
Ker, N. I., City Engineer, Ottawa, Can.
Kern, Fred J., Mayor, Belleville, Ill.
Kummer, F. J., General Manager U. S. Wood Preserving Co., 29 Broadway, New York, N. Y.

Leisen, Theo. A., Wilmington, Del.
Lewis, N. P., Chief Engineer Board of Estimate and Apportionment, New York City.
Luster, W. H., City Surveyor, Elizabeth, N. J.

McCartin, J. M., Street Commissioner, Birmingham, Ala.
McClintock, John N., Consulting Engineer, 45 Milk St., Boston, Mass.
McMath, Robert E., 327-328 Lincoln Trust Bldg., St. Louis, Mo.
McMillan, Chas., City Clerk, Calgary, Canada.
Magley, Wm., Board of Public Service, Cincinnati, O.
Markbreit, L., Waterworks Commission, Cincinnati, O.
Mead, D. W., 605 First Natoonal Bank Bldg., Chicago, Ill.
Melvin, T. H., Sewer Dept., Wilmington, Del.
Minshall, Frederick, Consulting Engineer, Abbeville, S. C.

Nelson, John A., City Engineer, Mitchell, S. D.
Neville, Thos., Deputy Commissioner of Public Works, Rochester, N. Y.

O'Brien, F. J., Street Commissioner, Oswego, N. Y.
Owen, Jas., Consulting Engineer, 196 Market St., Newark, N. J.

Parent, Arthur, Supt. City Lighting Dept., Montreal, Canada.
Parker, G. A., Superintendent Keney Park, Hartford, Conn.
Phillips, Geo., Board of Public Works, Newark, N. J.
Phinney, F. J., Superintendent Water Works, Rockford, Ill.
Pollock, Clarence D., Assistant Engineer Bureau of Highways, Brooklyn, N. Y.
Potter, W. G., City Engineer, Greensboro, N. C.
Provost, A. J., Jr., Engineer to Borough President, Brooklyn, N. Y.
Provost, Peter, Chief Fire Dept., Ottawa, Canada.

Rankine, E. S., Engineer Sewer Department, Newark, N. J.
Reed, Alex., U. S. Wood Preserving Co., 29 Broadway, New York, N. Y.
Reichardt, Walter F., Assistant City Engineer, Little Rock, Ark.
Reimer, W. H. V., City Engineer, East Orange, N. J.
Reiter, George W., City Engineer, Salt Lake City, Utah.
Richey, A. D., City Engineer, Elwood, Ind.
Rommel, Geo., Jr., Engineer Street and Sewer Dept., Wilmington, Del.
Rust, Chas. H., City Engineer, Toronto, Ont.
Ruttan, H. N., City Engineer, Winnipeg, Manitoba.

Sanderson, H., Alderman, Winnipeg, Man.
Schmidt, Jacob, Assistant Engineer, Bureau of Highways, Borough of Brooklyn, N. Y.
Sheridan, John C., Assistant Engineer, Bureau of Highways, Borough of Brookyln, N. Y.
Sherrerd, M. R., Superintendent Waterworks, Newark, N. J.
Shipman, Charles M., Gen'l Supt. of Works, Newark, N. J.
Skaife, Lewis, 20 St. James St., Montreal, Canada.
Strachan, Joseph, Assistant Engineer, Bureau of Highways, Borough of Brookyln, N. Y.

Steece, Emmet, City Engineer, Burlington, Ia.
Stewart, Wm. J., First Assistant City Engineer, Rochester, N. Y.
Stobaeus, J. B., Member Board of Trade, Newark, N. J.

Talbot, A. N., Professor of Civil Engineering, University of Illinois, Urbana, Ill.
Taubenheim, Ulrich E., Manager City Waterworks, Archangel, Russia.
Thompson, A. D., 304 Masonic Temple, Peoria, Ill.
Thompson, S. C., Prin. Asst. Engineer Bureau of Highways, Borough of Bronx, New York.
Tillson, Geo. W., Chief Engineer, Bureau of Highways, Brooklyn, N. Y.
Todd, Fred. G., Landscape, Architect, Montreal, Canada.

Vinson, J. S., Board of Public Works, Newark, N. J.
Vrooman, Morrell, City Engineer, Gloversville, N. Y.

Weil, Samuel, Jr., Board of Public Service, Cincinnati, O.
Wheeler, Holland, City Engineer, Lawrence, Kan.
Whipple, George C., Consulting Engineer and Sanitary Expert, 220 Broadway, N. Y.
Wilmot, H. W., Expert Accountant, 54 William St., New York City.
Woods, F. H., Chairman Commission on Works, Toronto, Ont.

ASSOCIATE MEMBERS

Adler, Arthur A., 804 Chamber of Commerce, Chicago, Ill.
Anders, W. R., 1813 Chemical Bldg., St. Louis, Mo.

Bangham, Richard, Ontario Asphalt Block Co., Windsor, Ont.
Beck, H. N., Mgr. Canada Fire Hose Co., 14 St. Sacrament St., Montreal, Canada.
Berger, W. A., Manfr. Surveying Instruments, 37 William St., Boston, Mass.
Blair, F. N., President Blair Light Co., Northboro, Mass.
Buff, Lewis F., Asst. Treas. Buff & Buff Mfg. Co., Jamaica Plains, Boston, Mass.
Buffalo Steam Roller Co., Buffalo, N. Y.

Cameron, Hugh, Agent Waterous Engine Co., 72 Queen St., W. Toronto, Canada.
Coburn, H. P., General Manager, Sawyer & Massey Co., Hamilton, Ont.
Cochrane, D. J., Sicily Asphaltum Paving Co., Montreal, Canada.
Colas, Jules, Mfr. of steel gullies, 6 St. Denis St., Montreal Canada.

Decarie, F. L., Chief Engineer, Decarie Mfg. Co., Minneapolis, Minn.
Dill, Charles W., Manager Constructing & Paving Co., Toronto, Ont.
Drummond, T. J., President Montreal Pipe Foundry Company, Vice-President Montreal Water & Power Co., Montreal, Canada.

Ellis, Geo. V., President Ellis Company, 216 W. 23rd St., New York City, N. Y.

Folger, M., President, Thompson Meter Co., Brooklyn, N. Y.
Folkes, E. C. E., Manager Wilkinson Plough Co., Toronto, Can.
Fuller, H. J., President, Canadian Fairbanks Co., Montreal, Can.

Godson, A. W., President, Godson Contracting Co., Toronto, Can.
Gould, Norman J., Seneca Falls, N. Y.
Gravel, Ludger, 26 Place Jacques Cartier, Montreal, Can.

Hill, A. J., American Asphaltum & Rubber Co., Chicago, Ill.

Ingram, G. M., 81 N. Cherry Street, Nashville, Tenn.
Irwin, A. B., Sec. and Treas. Pacific Coast Pipe Company, 1551 Granville Street, Vancouver, B. C.

Koelsch, P. A., Dealer in Engineers' Supplies, 138 Fulton Street, New York City, N. Y.

McEvoy, John G., Secretary and General Manager McEvoy Vit. Brick Co., 1345 Arch Street, Philadelphia, Pa.
Martin Harry K., Fire Appliances; Street Railway Chambers, Montreal, Can.
Morrison, James, President James Morrison Brass Mfg. Co., Toronto, Ont.
Morrison, T. A., 204 St. James St., Montreal, Can.
Mussen, W. H. C., 299 St. James Street, Montreal, Can.

Pittsburg Filter Company, Pittsburg, Pa.
Pough, F. H., Sewer Cement Manufacturer, 28 Burling Slip, New York City.

Rinkert, H. T., Sec'y and Treas. Metropolitan Paving Brick Co., Canton, Ohio.
Root, John M., General Manager Decarie Manfg. Co., Minneapolis, Minn.
Russel, Jas. C., Sec'y and Treas. John McDougal Caledonian Iron Works Co., Montreal, Can.

Sayer Electric Co., 14 Beaver Hall Hill, Montreal, Can.
Scholl, Julian, 126 Liberty Street, New York, N. Y.
Sessions, Wm. E., Prop. Sessions Foundry Co., Bristol, Conn.
Sise, Paul, Manager Northern Electric Co., Montreal, Can.
Strain, Jas. H., Road Rollers and Road Machinery, 254 East Twenty-first St., Brooklyn, N. Y.

Trudel, Tancrede, 107 Bleury Street, Montreal, Can.

Warren, Geo. C., 93 Federal Street, Boston, Mass.
Wertz, J. L., Vice President Neptune Meter Co., 120 Liberty Street, New York City, N. Y.
Whitaker, W. H., Sec'y Gould, Shapley & Muir Co., Brantford, Ont.
Wood, R. D. & Company, Waterworks Supplies, 400 Chestnut St., Philadelphia, Pa.
Wunder, F. A., Iroquois Iron Works, Buffalo, N. Y.
Wyllie, H. D., General Manager Cameron Septic Tank Co., 812 Monadnock Block, Chicago, Ill.

NEW YORK, October 17th., 1905.

MR. GEO. W. TILLSON, Sec'y American Society of Municipal Improvements,
Room 12, Municipal Bldg., Brooklyn, N. Y.

DEAR SIR: It is the hope of the Board of Directors of the American Society of Civil Engineers that its cordial relations with other associations of engineers be maintained and if possible strengthened.

I am therefore directed to say that the Society will always be glad to receive visits from your members; that its Reading Room and Library are open to them; and that their presence at any of its professional meetings (which are held at 8:30 P. M. on the first and third Wednesdays of each month, with the exception of July and August) will be most heartily welcome.

Trusting that you will inform the membership of your Society that this is the case, and that we shall have the pleasure of receiving such of them as may find it convenient when on New York, I am

Yours faithfully,

CHAS. WARREN HUNT,

Secretary.

PROCEEDINGS

OF THE

TWELFTH ANNUAL CONVENTION

OF THE

American Society of Municipal Improvements

HELD AT

MONTREAL, CAN., SEPT. 5, 6 AND 7, 1905

The opening session of the Convention was called to order at 2:30 P. M., on Tuesday, September 5th, 1905, at the Crystal Rink, Montreal, the President of the Society, Mr. A. Prescott Folwell, being in the chair.

Vice President, Mr. John R. Barlow, opened the proceedings by introducing His Worship, Mr. H. Laporte, Mayor of the City of Montreal. Mr. Barlow spoke as follows:

Mr. President and Members of the American Society of Municipal Improvements: We have with us this afternoon His Worship Mr. Laporte, Mayor of this City of Montreal, who has kindly consented, on behalf of the citizens, to extend to us the welcome of the city. I take great pleasure in introducing Mr. Laporte to you.

MR. LAPORTE: Mr. President, and Ladies and Gentlemen of the American Society of Municipal Improvements: It was a pleasant intelligence for me when I learned that your Society proposed holding its convention in our City of Montreal. The reputation of your Association had preceded you here, and I remember at least two of your members, our city surveyor, and our building inspector telling us months ago of the great work which you are undertaking, and which is bearing such good results.

It is indeed a pleasant task for me, as mayor of this city, and on behalf of the citizens generally, to extend to you all a most cordial wel-

come, and to assure you that we consider ourselves honored by your presence.

I have been told that the object of your Association is to disseminate information and knowledge concerning municipal matters generally, and to promote the best methods in connection with the management of all municipal departments. Your labors are such that they are of direct interest to municipalities throughout the entire American Continent, inasmuch as you deal with conditions generally affecting every one of them.

Montreal is gaining ground rapidly as a convention city, and we are pleased that this is so, and that it is becoming quite a usual thing for American and Canadian societies to assemble here, because we feel that nothing tends more to promote that "entente cordiale" between two countries than this same visiting and friendly intercommunication of the people.

Therefore, I pray you, ladies and gentlemen, to consider yourselves quite at home in our city, the Commercial Metropolis of Canada, and I hope that your convention will be a great success, and will result in benefits to yourselves as a body, and to the community at large. I also trust that after your meeting here you will return to your homes bringing with you pleasant and kind memories of your visit to Montreal.

MR. BARLOW: It is my pleasant duty to present to you Mr. C. H. Catelli, representing the Chambre de Commerce of the City of Montreal.

MR. CATELLI: Mr. Chairman and Gentlemen: It is with marked pleasure that I greet the coming of your Association to the metropolis of Canada.

In tendering you this welcome I simply voice the sentiments of the "Chambre de Commerce," which I have the honor to represent at this function, through the inability of our President to be here.

Your Association is performing a task of the greatest importance to urban populations: the health and comforts of city life. Its work is of the most momentous importance to mankind at large.

The program of your meetings, which is very comprehensive, covers almost the whole ground. I read, for instance, "Statistics" at the top of the list, which check the conditions of mortality and births, and thereby helps to control the sanitary conditions of the vulnerable point of a country—the cities and towns.

The "Municipal Franchises"—a question up to date in different cities, but it seems of the greatest economic complexity.

"Taxation and Assessment, City Government and Legislation." Some of our city fathers will, no doubt, take up this question.

"Park Development and Maintenance." "The parks are the lungs of a city."

"Street Paving." A subject of the greatest importance to a commercial and industrial city.

"Disposition of Garbage and Street Sweepings"—Two great causes of contamination of the air, and the origin of the spread of diseases.

"Street Lighting"—The most efficient auxiliary of the police, and a safeguard against crime.

"Waterworks and Water Supply"—Pure water has been stated to be the greatest sanitary agent of nature. We need pure and cheap water in unlimited quantities.

"Sewage and Sanitation"—The safe disposal of the sewerage of a large city is of the greatest importance to a vast expanse of country. The danger of the pollution of rivers and ponds being ever present, with its train of attendant diseases, etc., makes this probably one of the most important of all the subjects that have to be dealt with.

This dry enumeration of subjects for discussion suffices to show the vastness of the domain and the great importance of your meetings in dealing with the conditions of life and sanitation in cities and industrial centers.

The great task to which you have set your hands is not of a class which admits of an easy, quick and general solution, but your Association contains all the elements that help to secure the desired success. Of this I have not the least doubt.

I thank you, ladies and gentlemen, for your kind attention, and I hope that one and all will enjoy the stay in this city of ours, and that the meeting will be one of the most successful that you have ever held.

MR. BARLOW: I now present to you Mr. Charles Chaput, Vice President of the Canadian Business Men's League. Mr. Miles, the President of that organization, has found it impossible to be present, and has delegated Mr. Chaput in his stead. I am very pleased to introduce Mr. Chaput.

MR. CHAPUT: Mr. President, Ladies and Gentlemen: After what has been said so eloquently by the two previous speakers I might dispense with addressing you entirely, but, as representing the Business Men's League, I cannot allow this opportunity to pass without adding my welcome to what has already been said.

In the name of the Business Men's League, I wish you all a hearty welcome to this grand old city of ours, and I hope that your stay with us will be pleasant and profitable.

The Montreal Business Men's League has, since its inception, taken a deep interest in all conventions that come to our city, and I think I may say without fear of contradiction that the honor and pleasure of having you here to-day is due, to a very large extent to the energy of

one of our members, Mr. Alcide Chausse, your Finance Committee Chairman. (Applause.)

You are here, gentlemen, on business, and I might say very important business. The prosperity of a city, and its growth depend largely upon its municipal administration, and one of the objects of your Association is to improve that administration, and I do not doubt, Mr. Chairman, that a great deal of good will be derived by the City of Montreal from your convention here to-day.

I hope that you will leave our city feeling that you have been able to combine business with pleasure.

MR. BARLOW: I have been informed that the Honorable Mr. Gouin, Prime Minister of the Province of Quebec, and the President of the Board of Trade have been unable to make arrangements to be present with us. Those gentlemen regret exceedingly their inability to be here, and I am sure that we would have very much appreciated the opportunity of listening to them if it had been possible for them to come.

I will call upon our President, Mr. A. Prescott Folwell, to respond to the kind words of welcome which have been extended to us.

PRESIDENT FOLWELL: Your Worship, and gentlemen representing the Citizens' Associations who have extended us so cordial a welcome: On behalf of the American Society of Municipal Improvements I desire to thank you first of all for your kind welcome to your city, and for your appreciation of the aims and objects of our Society, and also for the preparations which you have made for our entertainment, which no doubt will prove to be of the most interesting character, being different to anything we have ever before experienced, as an organization.

In fact, so thorough has been your desire to please us that I notice that you have even had some of your streets washed, and given the city a most careful cleaning.

This Society, gentlemen, is named the American Society of Municipal Improvements. I notice that on this side of the line, as well as on our side, the word "American" is, to a large extent, confined to the United States, but in the naming of our Society, and certainly in the carrying on and development of it, the word "American" has been used in its broader and it seems to many of us, its truer sense—as comprising the whole American Continent.

We are very glad that we can count among our membership a considerable percentage of the citizens of Canada, and we find among them some of our worthiest members. We have selected one of your citizens, Mr. Chausse, year after year for the Chairmanship of our Finance

Committee, and a year or two ago, as was facetiously remarked by a former President, or by a member, we were proud to be under a Canadian President, although we were citizens of the United States.

In this Society we have done all in our power to cement the bonds of friendship, and stretch hands—not across the sea—but across the international boundary to our colleagues, the citizens of Canada, and I think when we United States Americans are entertained by the City of Montreal, as we were six years ago by the City of Toronto, and become acquainted with your citizens and the beauties of your city, and receive such excellent and cordial treatment from your citizens as we have been receiving, we can fairly well consider ourselves as a branch of the Peace Congress. I believe, in fact, that we deserve to be recognized as a Chapter of the International Peace Congress, for there is nothing better than acquaintanceship to cement one nation to another, and to prevent recourse to arms.

If in the course of a few more years it should be our good fortune to come to Canada again for one of our conventions, and we are treated as we have been in the past, surely no Congress could make us take up arms against one another.

The members of our Association and the visitors have looked over the splendid program of entertainment that has been prepared for us with very much interest and we look forward with anticipation to its being carried out, and on behalf not only of the Association, but on behalf of the ladies and the other visitors, I wish again to thank you, and through you the citizens of Montreal for your most generous and cordial treatment.

I think we may consider this as the formal opening of the Twelfth Annual Convention of this Association in the City of Montreal.

The first business session of the Society was called to order at 3:10 P. M., on Tuesday, September 5th, the President, Mr. A. Prescott Folwell, being in the chair.

After the meeting had come to order the President said:

In the past it has been customary to dispense with the roll call, inasmuch as the roll of members consists, or should consist of the register. If there are any members present who have not signed the roll it is to be hoped that they will do so as soon as possible. We have to insist on this at every meeting. It is very important, as it is the only record we have of those in attendance upon the meeting.

The next order of business is the reading of the minutes of the last meeting. Since they have been published, and each member

furnished with a copy, it does not seem necessary to read them here, and so, if there is no objection, we will dispense with the reading of the minutes of the last meeting.

There being no objection to not reading the minutes we will pass on to the next order of business, which is the consideration of applications for membership.

THE SECRETARY: I have applications for membership from the following gentlemen:

CORPORATE MEMBERS.

John C. Sheridan, Assistant Engineer, Bureau of Highways, Borough of Brooklyn.
Jos. Strachan, Assistant Engineer, Bureau of Highways, Borough of Brooklyn.
Geo. Berry, Assistant Engineer, Bureau of Highways, Borough of Brooklyn.
E. J. Fort, Assistant Engineer, Bureau of Highways, Borough of Brooklyn.
Geo. C. Whipple, Consulting Engineer and Sanitary Expert, 220 Broadway, New York.
W. H. Luster, Jr., City Surveyor, Elizabeth, N. J.
F. W. Dalrymple, City Engineer, Bayonne, N. J.
John E. Griffith, Asst. Engineer Department of Water Supply, Brooklyn.
U. E. Taubenheim, Manager City Waterworks, Archangel, Russia.
Arthur Parent, Supt. City Lighting Department, Montreal.
E. A. Harper, City Engineer, Kansas City, Mo.
E. W. Case, City Engineer, Colorado Springs.
Henry E. Baker, City Engineer, Watertown, N. Y.
Wm. H. Floyd, Jr., City Engineer, St. Joseph, Mo.
Geo. W. Riter, City Engineer, Salt Lake City.
Bryce R. Blair, City Engineer, Carbondale, Pa.
Thos. D. Allin, City Engineer, Pasadena, Cal.
Frederick Minshall, Consulting Engineer, Abbeville, S. C.
J. E. Breen, Chief Engineer Board of Public Service, Cincinnati, Ohio.
John H. Nelson, City Engineer, Mitchell, S. D.
Lewis Skaife, 20 St. James Street, Montreal.
Holland Wheeler, City Engineer, Lawrenece, Kas.
Fred G. Todd, Landscape Architect, Montreal.
Howard G. Bayles, Consulting Engineer, 37 W. Thirty-fourth St., New York City.
Jacob Schmidt, Asst. Engineer, Bureau of Highways, Brooklyn, N. Y.
Morrell Vrooman, City Engineer, Gloversville, N. Y.
J. Walter Ackerman, City Engineer, Auburn, N. J.

C. R. Allen, Jr., City Engineer, Barre, Vt.
W. G. Potter, City Engineer, Greensboro, N. C.
Wm. H. Arthur, Supt. of Public Works, Stamford, Conn.
Hugh S. Grosser, City Statistician, 207 City Hall, Chicago, Ill.
J. M. Hamell, City Engineer, Hull, Que.
Geo. A. Carpenter, City Engineer, Pawtucket, R. I.
Peter Prevost, Chief Fire Dept., Ottawa, Ont.
A. L. Johnston, Sewer Dept., Wilmington, Del.
T. H. Melvin, Sewer Dept., Wilmington, Del.
S. A. Freshney, Sec. and Gen. Manager Board of Public Works, Grand Rapids, Mich.
Harry Bragg, Editor *Canadian Municipal Journal,* Montreal.
Chas. M. Shipman, Gen. Supt. of Works, Newark, N. J.
H. Sanderson, Alderman, Winnipeg, Manitoba.
C. W. Brown. City Clerk, Winnipeg, Manitoba.

ASSOCIATE MEMBERS.

Norman J. Gould, Seneca Falls, N. Y.
T. A. Morrison, 204 St. James St., Montreal.
Geo. C. Warren, 93 Federal St., Boston.
H. D. Wyllie, General Manager Cameron Septic Tank Co., 812 Monadnock Block, Chicago, Ill.
G. M. Ingram, 81 N. Cherry St., Nashville.
Julian Scholl, 126 Liberty St., New York.
Ludger Gravel, 26 Place Jacques Cartier, Montreal, Can.
H. J. Fuller, President Canadian Fairbanks Co., Montreal.
Richard Bangham, Ontario Asphalt Block Co., Windsor, Ont.
W. H. C. Mussen, 299 St. James St., Montreal.
A. B. Irwin, Sec'y and Treas. Pacific Coast Pipe Co., 1551 Granville St., Vancouver, B. C.
Buffalo Steam Roller Co., Buffalo, N. Y.
T. J. Drummond, Pres. Montreal Pipe Foundry Co.; V. P. Montreal Water and Power Co., Montreal.
John M. Root, Gen'l Manager Decaire Manfg. Co., Minneapolis, Minn.
F. L. Decarie, Chief Engineer Decarie Manfg. Co., Minneapolis, Minn.
Tancrede Trudel, 107 Bleury St., Montreal.
H. P. Coburn, Gen. Manager Sawyer & Massey Co., Hamilton, Ont.
Chas. W. Dill, Manager Constructing and Paving Co., Toronto.
Jules Colas, Mnfr. of Steel Gullies, 6 St. Denis Street, Montreal.
M. Folger, Pres. Thomson Meter Co., Brooklyn.
F. H. Pough, Sewer Cement Manufacturer, 28 Burling Slip, New York.
John C. McEvoy, Sec. and Gen. Mgr. McEvoy Vit. Brick Co., 1345 Arch Street, Philadelphia.
R. D. Wood & Co., Waterworks Supplies, 400 Chestnut St., Philadelphia.
J. L. Wertz, V. P. Neptune Meter Co., 120 Liberty Street, New York.
W. A. Berger, Manfr. Surveying Instruments, 37 Williams St., Boston.

P. A. Koelsch, Dealer in Engineers' Supplies, 138 Fulton St., New York.
Geo. V. Ellis, Pres. Ellis Company, 216 W. Twenty-third St., New York.
F. N. Blair, Pres. Blair Light Co., Northboro, Mass.
A. W. Godson, Pres. Godson Contracting Co., Toronto, Ont.
Pittsburg Filter Co., Pittsburg, Pa.
Sayer Electric Co., 14 Beaver Hall Hill, Montreal, Can.
E. G. E. Folkes, Mgr. Wilkinson Plough Co., Toronto.
Hugh Cameron, Agent Waterous Engine Co., 72 Queen Street, W. Toronto.
Jas. C. Russel, Sec. and Treas. John McDougal Caledonian Iron Works Co., Montreal.
H. N. Beck, Mgr. Canada Fire Hose Co., 14 St. Sacrament St., Montreal.
W. H. Whitaker, Sec. Gould, Shapley and Muir Co., Brantford, Ont.
James Morrison, Pres. James Morrison Brass Mfg. Co., Toronto.
H. T. Rinkert, Sec. and Treas. Metropolitan Paving Brick Co., Canton, O.
Wm. E. Sessions, Proprietor Sessions Foundry Co., Bristol, Conn.
Lewis F. Buff, Asst. Treas. Buff and Buff Mfg. Co., Jamaica Plains, Boston.
Paul Sise, Mgr. Northern Electric Co., Montreal.
Harry K. Martin, Fire Appliances, Street Railway Chambers, Montreal.
W. R. Anders, 1813 Chemical Bldg., St. Louis.
F. A. Wunder, Iroquois Iron Works, Buffalo.
A. J. Hill, American Asphaltum and Rubber Co., Chicago.
D. J. Cochrane, Sicily Asphaltum Paving Co., Montreal.

MR. SHERRERD: I would move that the Secretary be requested to cast a single ballot electing those gentlemen to membership.

Which, being duly seconded, was carried, and the Secretary cast the ballot as requested, and the applicants were declared members of the Society.

THE PRESIDENT: The next item of business is the President's address. This year the President has only written a comparatively brief address, knowing that we would have a good many papers and a great deal of other business to deal with.

If you will bear with me for a few moments I will try to get through my remarks as quickly as possible, and we will pass on to things more interesting.

PRESIDENT'S ANNUAL ADDRESS.

Eleven years ago to-day, less two weeks, this Society was organized in Buffalo, with sixty members. During the next three years this number greatly increased, and the Society became recognized as an influential

and important body of workers for municipal progress. Its good work has continued, and the Society has maintained a high reputation for earnest endeavor, which it is to be hoped it will continue to deserve. Of the size of its membership, however, the record is less favorable. While the good accomplished by a society is by no means to be gauged by its size, yet its influence can not be as well maintained or as widespread, nor will its standing be as generally recognized if its numbers diminish too seriously. During the second three-year period of this Society's history the number of members decreased practically one half; and during the four succeeding years it remained practically stationary, making a net gain of but eleven during that time. To many of our members this failure to increase in size seemed ominous—a halting in uncertainty between a lapse into oblivion on the one hand and on the other a great increase in size and influence. With the hope of directing it toward the latter, they have made a special effort this year to increase the membership, and have so well succeeded that we have in one year more than recovered all our lost ground, and our membership is now larger than ever before. Thus encouraged, it is hoped that not only those who have already done such good service for the Society, but all the members will continue the work, and that our numbers may be increased by at least fifty per cent annually until every municipality of the country is represented.

If there is a place for this Society which no other fills, if there is a work for this Society to do which is not within the province of any other, then it is our duty to make our utmost endeavor to extend its power for good into every city of the land. But if there is no good and logical reason for its existence, if the work we are attempting to perform is of no value or is a mere duplication of that which is being better done by others, then our efforts are being wasted, and the sooner we appreciate this and disband, and direct them into other channels the better for us as individuals and for the cause of municipal betterment. If there *is* a certain area in the field of municipal advancement which is pecularíarly our own—and I firmly believe there is—then our best work will result from a study of its nature and confining our energies within its boundaries.

As stated by our Constitution, the object of this Society is "to disseminate information and experience upon, and to promote the best methods to be employed in, the management of municipal departments and in the construction of municipal works."

The National Municipal League is largely composed of citizens as such only who consider "political, administrative and educational phases of the municipal problem." In the League of American Municipalities are gathered the mayors and other officials of our cities to study "all questions pertaining to municipal administration." The purpose of the American Civic Association is "the cultivation of higher ideals of civic life and beauty in America."

The first two consider chiefly municipal administration as a whole, and the methods of co-ordinating various municipal departments, but in only a minor degree the details of the management of individual departments; while this last would seem to be explicitly stated as one of the objects of this Society, and one worthy of our earnest consideration.

At first thought it might seem that the field of engineering was already more than covered by existing societies. An examination of the work done by these, however, will show that this is not the case. The American Society of Civil Engineers and its Canadian sister, since they cover the entire field of engineering, pay very little attention to municipal engineering, as an inspection of their proceedings will show. The various state and sectional societies do somewhat more along this line, but the amount is still relatively small and there is a tendency to continuance in local ruts. The municipal engineers of Greater New York have recently formed a society which has a most promising future, but its membership is limited to that corporation. There is a place, then, for a society which will do for all the other and smaller cities of the country what this last society does for New York; and many of the members even of that society have joined with us for mutual benefit along the line of municipal engineering. One branch of this, however—water supply—is well served by several societies, notably the American Water Works Association and the New England Water Works Association. But street paving, cleaning and general maintenance, refuse collection and disposal, sewerage and sanitation (except as the latter is treated from the physician's point of view by the American Public Health Association) and many other avenues for municipal improvement await the assistance of this Society in their development.

The above considerations might give the impression that there is left for us only details of administration and construction, but such is far from being the case. We may treat as experts of the broad subject of the relative values of various utilities to a modern city, which are essential and which non-essential to its most profitable growth. We will be doing a better work in persuading a city to adopt proper sanitary garbage disposal than in designing the details of its plant. To demonstrate and convince of the sanitary superiority and greater economy of a sewerage system over cesspools is as important as to build the system.

But perhaps most important of all is it that we should offer opportunities to those civic officials who find them in no other society for that personal contact between those having similar aims and life purposes which gives them encouragement and inspirations of renewed vitality in their too often unappreciated and discouraged efforts for the betterment of their respective cities.

To a certain extent it is a weakness, but to a much greater extent should it be a strength, that our membership is not composed of one class only of officials, but that mayor, alderman, engineer and street and other superintendents all meet here to exchange ideas and learn each

other's points of view, and our discussions should be and to a large extent are demonstrations of the value of this.

Five years ago provision was made for admitting to the Society associate members, who should be interested in municipal supplies from a business point of view. A few such have read before us papers descriptive of their specialties, which have been of great general interest; but even to these the title associate member has not been applied, and nothing further seems to have been done in the matter until this year, which was unfortunate, as it is our duty to our several municipalities to know the latest and best in materials as well as in methods. The exhibition which is this year presented for our inspection is the first fruits of an endeavor to acquire associate members and make use of them for our good—and we hope for theirs also. There are undoubtedly many ways in which this exhibition could be improved. It is hoped, however, that the idea will be generally recognized as so beneficial to all that our associate members will decide to organize and arrange among themselves next year for a more complete and satisfactory exhibit than this first one can hope to be.

In retiring from the presidency of the Society I desire to thank you for the most cordial and untiring support which so many of you have given me in my efforts for its good, and to congratulate you most optimistically upon the outlook. If so much can be acomplished by so few in one year, what is not possible for the future with an increased and increasing number of workers? But continuous and long continued effort is required; continuous, that the delayed benefits of one year's work be not lost through failure the next year to exert the lesser efforts required to gather them in. It is my hope that I may have the honor to be past president of a society vastly larger and more influential than that whose presidency I am now about to resign to another, but whose interests I shall not therefor have the less at heart.

THE PRESIDENT: The next business before the Association is the report of the Secretary.

Is Mr. Tillson prepared to let us hear his report at this time?

THE SECRETARY: Yes, sir.

THE PRESIDENT: Immediately following the report of our Secretary, we will have to deal with the Treasurer's report. I suppose we might as well take the two of them together.

REPORT OF THE SECRETARY.

BROOKLYN, N. Y., Sept. 1, 1905.

American Society of Municipal Improvements:

GENTLEMEN: I herewith submit my report for the year ending September, 1905:

Receipts—	
Dues and entrance fees	$601.50
Sale of reports	49.25
Total	$650.75
Paid to Treasurer—	
1904.	
October 6	$140.00
November 9	161.25
December 3	26.00
1905.	
January 12	15.00
March 2	40.00
April 4	73.00
May 1	32.00
June 20	35.25
July 31	25.25
August 2	97.00
	$644.75
In hands of Secretary	$ 6.00
Total	$650.75

The expenses of the office for the year have been as follows:

Express	$3.70
Postage	15.65
Printing	9.25
Telegrams	1.69
Rubber stamp	.15
Total	$30.44

On account of the arrangements authorized by the Board of Directors and the Executive Committee, the proceedings of the last meeting have been issued without any cost to the Society. The demand for the Society proceedings has continued during the past year, as will be seen by the receipt from the sales.

All correspondence of the Society has been attended to, and a separate acount kept of each and every member. Notices have been given to the members of the proposed meetings, in accordance with the Constitution. At the meeting of the Executive Committee last year five members were dropped for non-payment of dues. During the year three members have resigned, one, Mr. G. Bouscaren, Chief Engineer of Water Works, Cincinnati, Ohio, has died, and Mr. Robert Allison, Board of Public Service, Cincinnati, died in March, 1903, but the Secretary was not notified until

1904. At the last meeting of the Society fourteen new members were elected, so that the net gain for the year has been five.

The Secretary wishes to express his thanks to all the officers and members of the Society for their co-operation during the year.

Respectfully submitted,

GEO. W. TILLSON,
Secretary.

REPORT OF TREASURER.

OSWEGO, N. Y., Sept. 2, 1905.

To the American Society of Municipal Improvements:

GENTLEMEN: I have the honor to submit the following report of Receipts and Disbursements for 1904 and 1905:

RECEIPTS.

Balance Oct. 1, 1904	$432.08	
Oct. 11, from George W. Tillson	140.00	
Nov. 11, from George W. Tillson	161.25	
Dec. 2, from George W. Tillson	26.00	
1905.		
Jan. 12, from George W. Tillson	15.00	
March 2, from George W. Tillson	40.00	
April 5, from George W. Tillson	73.00	
May 1, from George W. Tillson	32.00	
June 20, from George W. Tillson	35.25	
July 31, from George W. Tillson	25.25	
August 25, from George W. Tillson	97.00	
		$1,076.83

DISBURSEMENTS.

1904.	
Oct. 25, G. W. Tillson, expenses secretary's office	$40.87
Oct. 25, F. J. O'Brien, expenses treasurer's office	12.75
Oct. 25, George P. Coles, 200 pamphlets	20.00
Oct. 25, George M. Ballard, stationery and postage	4.00
Nov. 12, George W. Tillson, salary Sec. 1903-04	100.00
Nov. 12, Mary Burke East, reporting Convention	37.00
1905.	
Feb. 7, Free Press Pub. Co., circulars	8.75
March 4, The Brooklyn Citizen, printing	18.50
May 6, Free Press Pub. Co., circulars	8.50
May 16, The Hartford Printing Co., letter heads	3.25
July 14, Free Press Pub. Co., printing	34.00
Aug. 25, George W. Tillson, disbursements Sec.	30.44
Aug. 28, William C. Everhart, freight and cartage	3.78
Aug. 28, Free Press Pub. Co., circulars	8.00

Aug. 28,	A. Prescott Folwell, disbursements as Pres't..	$22.37	
	Exchange on checks received.....	2.70	
	Balance Sept. 2, 1905.....	721.92	
			$1,076.83

Yours very respectfully,
F. J. O'BRIEN,
Treasurer A. S. M. I.

THE SECRETARY: I would suggest, Mr. President, that the report of the Secretary and the report of the Treasurer be referred to the Finance Committee.

Which, being duly seconded, was agreed to.

THE PRESIDENT: Are there any Special Committees prepared to report at this time?

According to our Constitution any amendments must be submitted to the Association on the first day of the annual convention, so, if there are any proposed amendments they should be placed before us today in order to follow out the Constitution.

THE SECRETARY: Two amendments have been suggested, Mr. President. The first is to Article II, and consists in striking out the last sentence of the first paragraph in section 1, leaving it to read: "Section 1. Any municipality within America shall be eligible to membership in this Society; likewise any engineer, officer or director who shall have charge of or supervision over or be employed as a consulting engineer on any public or municipal department work."

The second amendment deals with Article III, and consists in striking out the entire article and replacing it by the following: "Each corporate member shall pay five dollars per annum as dues; and each associate member ten dollars per annum. All dues to be payable in advance on or before the date of the annual meeting."

This is practically the way the business is carried out now, and the amendment was suggested to conform to our practice.

MR. SHERRERD: Would it be proper to refer those proposed amendments to the Executive Committee?

THE SECRETARY: They come from the Executive Committee.

MR. SHERRERD: Does the Executive Committee recommend that those changes be made in the Constitution?

THE PRESIDENT: They are submitted to the meeting today, and they will be acted on later. We will deal with them at the last session of the meeting.

The next matter that we have before us is the selection of a Committee on Nominations and also a Committee on the Place of Our Next Meeting.

We will first take up the matter of the appointment of a Committee on Nominations. According to the Constitution this committee has to be appointed today. I think the custom has been to appoint five members, and I would be pleased to have the meeting suggest the names of five gentlemen to serve on this committee.

The following gentlemen were proposed and appointed as members of the Nominating Committee: Messrs. M. R. Sherrerd, C. H. Rust, E. A. Fisher, John R. Barlow and William Fortune.

THE PRESIDENT: We will now proceed with the selection of the Committee on the Place of Our Next Annual Meeting. There are five members to be elected to this committee.

MR. SHERRERD: Would it be in order to nominate the executive officers of the Society for this duty. It seems to me that they would be in a better position to decide on what is best than any other committee that we could appoint.

THE PRESIDENT: There are times when certain members, who are not on the Executive Committee, like to think that they themselves, or their friends have a say in some of the matters of interest to the Society, and personally I must say that I approve of the plan of nominating a separate committee for the duty of deciding where we shall hold our meetings.

MR. SHERRERD: That did not occur to me, Mr. President. I agree with you entirely.

The meeting then appointed Messrs. Pollock, Vincent, Grosser, Barrow and Freshney as members of the Committee on the Place of the Next Meeting.

THE SECRETARY: I wish to say that the Engineers' Club of Montreal and the Canadian Society of Civil Engineers have extended to us the privileges of their respective organizations, and hope that the members of this Society will pay them visits during our stay here.

I also have an invitation from the trustees and faculty of the University of Illinois to send a representative of this Society to attend the installation of Edmond Joseph James as president of that University. The installation is to take place on the 19th of October, 1905.

I have a letter from the Mayor of Chicago asking that the next meeting of the Association be held in that city, and a letter from the Bedford Springs Company, asking that the meeting be held at Bedford Springs. I would suggest that those two letters be referred to the Committee on Place of Meeting.

MR. SHERRERD: I would move that the Secretary be instructed to tender the thanks of the Society to the different organizations which have extended invitations to us.

MR. CRANDALL: I would like to suggest that the matter be referred to the Committee on Resolutions, and they can prepare resolutions, and submit them to the meeting. The matter will then be properly attended to. I would suggest this in amendment of Mr. Sherrerd's motion.

MR. SHERRERD: I agree with Mr. Crandall. That would be a better way of dealing with it. I will withdraw my motion, and second Mr. Crandall's instead.

THE PRESIDENT: As there are a great number of resolutions of thanks which it will be our duty and pleasure to pass, don't you think it would be better to do it at once, and have the Secretary acknowledge the invitations of the local societies, and the University of Illinois, with the customary thanks of the Society?

MR. CRANDALL: I think it is a much simpler way than mine.

Which, being seconded by Mr. Sherrerd, was agreed to.

THE SECRETARY: Regarding the invitation from the University of Illinois, I would move that Professor A. N. Talbot, who

is a member of this Society, be delegated to represent us at the installation of their new president.

MR. O'BRIEN: It seems to me that it would be better if some past president of this Society were chosen to represent us.

MR. SHERRERD: Why could we not have Mr. Folwell, our worthy president, represent this Society at that function?

Professor Talbot belongs there, and Mr. Folwell does not, but would go there especially to represent this Association, whereas Mr. Talbot may have other duties to attend to.

THE SECRETARY: I did not mean to confine it to Prof. Talbot. I simply wanted to be sure that someone would be there as a delegate from this Society.

THE PRESIDENT: I doubt very much whether I would be able to go. I think it might be well for us to nominate some gentleman who is on the spot.

THE SECRETARY: Of course Professor Talbot would not represent the Society without some authority to do so.

MR. O'BRIEN: Perhaps we might have a little more representation. The Professor is a member of the Faculty, and will have to fill his place as such, therefore he would not be in a position to represent this body in the eyes of the public as well as someone who is not so closely connected with the university.

I think that some past president of the Society should be appointed to represent us—leaving it to the Executive Committee, perhaps, to decide just who our representative shall be.

MR. BROWN: I move, Mr. President, that yourself, and the Secretary and Mr. Talbot be appointed to represent this Society at the installation of the new President of the Illinois University.

Which, being seconded, was carried.

MR. GROSSER: I would like to add to that motion a clause to the effect that the expenses of the representation be borne by the Society.

MR. BROWN: I will accept the amendment, and am pleased to have it form part of the main motion.

MR. JOHNSTON: It seems to me that we are asking for a rather large delegation, and that this is a lot of expense for us to go to in order to attend the installation of the president of a college.

THE PRESIDENT: Possibly it was not implied, but it was my understanding that one gentleman is already on the ground, and the idea of appointing the other two was that if one could not go the other would.

MR. GROSSER: Might I say a word, Mr. President. This function does not take place in Chicago. It is the installation of the new president of the State University of Illinois, at Urbana, Ill., and it is being made a very great affair, and all societies of public standing have been invited to attend that installation. It seems to me that a representation from this Society, at such a function as that, will certainly accrue to the benefit of this Society as a body. As the old saying goes, "It pays to advertise," and the presence of a committe from this Society on that occasion will certainly advertise this organization, if it does not do anything else.

MR. JOHNSTON: I have no particular objection to sending a representation, but it struck me, at first sight, that we were sending too large a committee for such a function.

THE PRESIDENT: I am informed that the maker of the motion intends that only one member shall attend the installation, and that the committee was made of two in order that one would be sure to be there.

If there is no further business to come before the meeting we will now proceed to the reading of the papers.

The first paper is the report of the Committee on Municipal Data and Statistics. Mr. William Fortune, Indianapolis, is chairman of this committee.

To the President and Members of the American Society of Municipal Improvements:

GENTLEMEN: The Committee on Municipal Data and Statistics presented last year the forms adopted by the U. S. Census Bureau for collecting statistics of cities, and that bureau publishes almost simultaneously with this meeting the first installment of statistics, being those collected from cities of more than 25,000 inhabitants.

Mr. L. G. Powers of the Bureau of Statistics in the same U. S. Department of Commerce and Labor in a resent address calls attention again to the need of some uniformity in methods of accounting and reporting, as shown by the difficulties which the agents of the statistical bureaus find in securing the returns called for by their blank forms. It is necessary for an agent to visit every city in order to get together the material necessary to fill the blanks properly and completely and it is not then possible in the limited time to which can be spent in any one city to unravel all the puzzles which are found, so that there are frequent failures to reduce data to the same terms, and it is consequently not always safe to make comparisons of details too closely. One must know personally something about the methods in use in the cities he wishes to study before he can know how closely the data in the census reports conform to a common standard.

The forms of report which this committee has heretofore presented for the approval of this Society would be of some assistance to the Census Bureau if their adoption could be brought about. They have been carefuly worked out so that they can be used with any real system of city accounts, but many cities would find it necessary to make collections of data from various city offices in order to use the forms of report in full. Should the forms be adopted, the first year would require much work, but when the locations of data and methods of getting them together, and officials to be responsible for the work have been determined, later years would require much less attention. This is shown by the experience of water departments in adopting the standard form of reports of operations of water works. It is seldom that the use of this form is discontinued after it has once been adopted.

The long campaign for the adoption of this one form, carried on mainly by the New England Waterworks Association, is gradually bearing fruit. This campaign has included a liberal distribution of printed copies of the forms among water works companies and departments and some personal work. If this Society is to have any success in securing the adoption of the forms which it has approved, it must do likewise. No progress in the adoption of the forms can yet be reported. Not one city which is a member of this Society has paid the slightest attention to them, and no one outside of it seems to have the slightest knowledge that they are in existence. The experience of the New England Waterworks Association was the same at the beginning of its agitation, so that there is no great surprise in this failure. It only emphasizes the fact that the members of the Society must be familiarized with the forms, as well as officials of other municipalities. This can only be done by presenting the forms in shape for distribution in the departments where they are needed. If the funds can be spared for this work, this committee recommends their publication in separate and convenient form. This will remove the only possible objection of members of this Society to the consideration of these forms—that of ignorance of them. These forms were prepared

as the result of complaints from members of the Society of the lack of comparable data. They certainly should be used by those who have made these complaints as their contribution to the work of securing uniformity. They can scarcely complaint of others if they are not willing to do their share. The forms must be satisfactory, or they would not have been unanimously adopted after some three or four years opportunity for study and criticism. The reform must begin at home, if it is to begin anywhere.

It does not seem possible to change methods of accounting without action of state legislatures. Ohio now has a uniform system of accounting which has been presented by a state accounting department. Inquiry among city officials shows that for the first year or two there was much trouble and dissatisfaction, but after the system is once established in a city it is very satisfactory. The only complaint then arising is that the state department exercises too close a censorship upon payments and does not allow accounts which it considers advisable to reject. For example, the propriety of payment of the expenses of delegates to such a convention as this is questioned by the state department, and it is said that some such payments have been disapproved. This interferes with the principle of home rule and somewhat stretches the principle upon which the state department of accounts is founded, namely, that of looking after the form and manner of acounts and watching for errors and dishonesty in officials. Any account which has been approved by the proper municipal official or body should not be subject to the disapproval of the state department. The publication of the reports and of the comments of the department is all the check on the public action of the municipal officials which can be permitted without undue interference by state officials in local affairs.

The municipal reports received from Minnesota, Wyoming and California give evidence of similar laws in those states. Such laws should be encouraged elsewhere. The usual objection made to them is regarding the expense of the state department, but this has been shown by experience to be unfounded, as the expense is very slight. In comparison with the benefits derived it is not worthy of consideration. If the state department is not given power of too rigid censorship of appropriations by city councils, there are no other objections which are not offset many times over by the savings in errors and in defalcations and in the increased attention to the propriety of making appropriations which comes from the certain publication of all financial transactions in a form which reveals all their benefits and their iniquities.

Respectfully submitted,

WILLIAM FORTUNE,
Chairman.

H. W. WILMOT.

MR. FORTUNE: I wish to add verbally that I think the greatest progress which has been made during the past year was the work

adopted under the direction of Mr. Wilmot (who is a member of this Society) in the City of Minneapolis. There they have devised forms that are considerably in advance of anything that has yet been offered. They have accomplished what was said to be impossible in Minneapolis, and what is still regarded as impossible in many cities, and that is a trial balance of municipal accounts.

Mr. Wilmot has prepared a paper to present to this meeting, in which he deals in detail with the work that has been accomplished.

THE PRESIDENT: Mr. Fortune's report is before the Society for discussion, and I wish to say right now that I hope the discussions of the several papers will be free and full. I think a paper is specially interesting for the discussion it brings out, and the discussion is frequently as valuable as the paper itself. I trust that all the members will feel free to discuss the papers fully and thoroughly.

MR. REIMER: I have not charge of the water department of East Orange, New Jersey, but my son has, and I would like to know whether one of the reports ever got there. I have not seen them.

THE PRESIDENT: They have been published in the proceedings twice, I think.

MR. FORTUNE: They have been published in the proceedings. This committee has not sent out reports specially to any department of city government anywhere, therefore it has not been brought to the attention of the heads of departments unless they found it in the reports.

MR. GROSSER: Mr. President, you will pardon me, as one of the youngest members of the Society, if I take part in the discussion, but this is a subject in which I am particularly interested, and to which I have given a great deal of thought during the last five years.

I did not know of the existence of a system of schedules for city reports, and was very agreeably surprised when Mr. Fortune informed me yesterday that there was such a schedule in existence.

I would like to suggest this. As Mr. Fortune pointed out in his paper, the existence of those schedules is of no earthly benefit to anybody unless we can make those schedules work, and the suggestion thrown out by Mr. Fortune that they should be distributed all over the country appeals to me as being a very good one.

I will go further than this, and say that it will be possible to get a uniform system of reports only if we compel each member of a municipality to go to work along certain lines, and the only way to do that is to add our influence and "pull" with our councils and have them adopt that schedule by ordinance. In this manner we can compel each city official to make his reports along the lines desired.

If we try this, and it works successfully, I am sure that next year a number of cities will be in a position to render reports along the lines laid down.

I will say further that a great deal has been said about the uniform system of accounting. I do not like this expression. I think it is a misnomer. So far we have achieved nothing except a uniform system of bookkeeping (which is not accounting by any means). Financial accounts have been made uniform, as Mr. Fortune has pointed out—Minneapolis has an excellent system, so has Chicago, so has St. Paul and a number of other places, but a great many of them have arranged their financial accounts according to the system recommended by the National Municipal League. That is one of the things that the Municipal League has achieved.

The City of Chicago has expended over seventy-five thousand dollars in introducing a new system of financial accounts. I just mention this as an instance of what the municipalities are willing to do when they see what they consider a good thing.

I have spoken before the National Municipal League Convention, and have been in communication with a good many city officials, always to the effect that in order to make those financial accounts of value to cities for comparative purposes it is necessary to connect with the financial accounts an account of the services rendered, for it is only by comparing the two that you can find any equitable basis of comparison between two cities.

It does not mean anything for the City of New York, for instance, to say that they expended five million dollars for street cleaning, and the City of Chicago to say that they expended about three hundred thousand dollars. It is necessary to show the amount of cleaning that was done—the character of the cleaning that was done, and the character of the streets upon which the cleaning was done. If this is shown, then we can measure the thing up and compare one thing with another.

I believe that this Society, more than any other, is called upon, and is particularly equal to introducing just such improvements as have been mentioned.

Mr. Powers, in his paper at Toledo, maintained the same thing.

I keep in my possession all the reports of different cities, for purposes of comparison, and I may tell you right here that no one appreciates the advantages and difficulties of comparison more than I do.

I am very frequently called upon to compare the work and the expenditure of one city with another ,and it is a tremendous job. I undertook it once and was at it for three months before I was able to get it out.

Speaking from that experience, I say that the aim of this Society ought to be towards the end of getting those schedules issued and adopted for city reports, and that they should show, in addition to the amount of money expended, the amount of work performed, and the nature of the work. If you get those two together you will have a perfect system of accounting.

Perhaps I might suggest that each member of this Society, on going home, should bring the matter before his council (or whatever the executive body of the city is called) and have them pass an ordinance adopting this as the official system of reporting.

You all know the amount of information you generally get from the report of an engineer which you pick up. You will read that twenty ditches have been cleaned out here, and a small bolt has been replaced there, and a wall has been whitewashed in some other place, or some pumping has been done, or the pumping station has been repaired. For page after page you will read such stuff as

that—which is of absolutely no use to anybody. It does not show the amount of work done, nor the nature of the work. A great many places have such reports as this—Chicago is not one of them.

Six years ago we established a Bureau of Statistics, and the duty of that bureau is to publish every quarter a publication called "City of Chicago Statistics." In this we give the reports of every department of the city's government. It is published in monthly columns, showing the amount of work done, the nature of the work, and what it cost.

Take for instance the item "Street Cleaning." We show this by wards. We show the amount of street dirt removed, in loads. We show the cost of this work. The system is not quite perfect yet, but we are working to perfect it.

In this bureau we cover every department, as I said, and there is one improvement that we have made and that is this—in former years the man in charge of the street cleaning would simply make up his report at the end of the year, and say, "During the year we cleaned eighteen thousand miles of streets." But there was nothing to show what sort of streets they were, or how they were cleaned, or anything more than the mere statement that eighteen thousand miles of streets were cleaned.

To-day in Chicago (although it may make you smile when I talk of street cleaning in Chicago, for it has been the custom to heap shame, and everything else on Chicago for its clean streets) we have a system by wards, and special forms upon which the men report the amount of cleaning, and the manner in which the cleaning was done, the character of the street and the cost, the number of laborers employed, and the number of teams employed. I am one of those who maintain that the streets of the City of Chicago are just as clean as those of any other city—in the business center.

What I have said about street cleaning also applies to garbage. We have no contract work, outside of the garbage removal, which is by contract.

We have not perfected our system yet, but we are getting there, slowly. I think some such system is one of the most potent features in preventing mismanagement, because it provides for publicity,

and in my opinion publicity is a cure for practically all municipal evils.

MR. SHERRERD: The chairman of the committee referred to the condition of things in Ohio, where the question of paying the expenses of the delegates to the different conventions was brought up. I think the report intimates that the use of those forms brought that question up, if I understood it well.

MR. FORTUNE: It is an Ohio system where the state exercises a supervision over the local accounts.

MR. SHERRERD: It came up at the meeting of the American Waterworks Association. This subject was dealt with and we found that it was questionable, under the laws of the State of Ohio, whether the expenses of delegates could be properly audited by municipalities.

I would like to say for the information of any of our members who may be from Ohio that we have been promised the co-operation of some of the members of the Central States Waterworks Association and the American Waterworks Association in the endeavor to have a law passed which will enable municipalities to audit the expenses of delegates to conventions, under proper supervision, of course.

MR. GROSSER: If I might again trespass, Mr. President, I have a question that I would like to ask. I did not quite understand the position. Does the committee recommend that the state have control of the accounts?

MR. FORTUNE: Not to the extent of disapproving of the accounts. Simply a supervision over the forms.

MR. GROSSER: I am sorry to have to ask the Chair for permission to speak a second time. I desire, however, to give you my opinion on that, in a very few words.

I am a firm believer in home rule. Every city ought to know what it can do, and what it cannot do, and it should not be informed of this by anybody else. I think that is a matter for each city to know for itself.

I do not believe in supervision on the part of the state. I do not see that it can benefit the position. It has not done so in the case of Ohio, so far, and it does not look as though it will. The accounts are not in much better shape than they were before.

MR. FORTUNE: I think that this would be as good a time as any for Mr. Wilmot to contribute his paper on this subject. I am sure that he can give us something of great value. I think that he has had more experience in this line than any other man in the country, and has had some very valuable experience recently.

It seems to me that this is the time for us to hear from Mr. Wilmot.

MR. WILMOT: I am afraid that Mr. Fortune has rather exaggerated the experience that I have had. It is true that I have been "up against" one or two cities in my time. I agree with Mr. Grosser as to the larger cities, such as New York, Chicago and Minneapolis, but the trouble with Mr. Grosser is this, he is away ahead of anything that cities have even began to dream of yet.

In the first place you will agree with me that cities must know how to keep a cash book, and I tell you frankly that they do not even know how to do that. I could tell you of a city whose accounts my firm has straightened out, and whose books had never been balanced before that. There was simply a list showing how much cash was received and how much was paid out. There had never been a trial balance.

The idea of the comptroller of the City of Minneapolis was simply that he had received so much and paid out so much. The charter of the City of Minneapolis was an extremely complicated affair, and his idea was the idea of an old woman—so many apples, so many cents. He had absolutely no notion of what his outstanding liabilities were, nor had he any idea of what his credits were.

With this introduction I will proceed with the reading of my paper.

MUNICIPAL ACCOUNTING REFORM, AS ILLUSTRATED IN THE CITY OF MINNEAPOLIS, MINN.

BY H. W. WILMOT, C. P. A.

Preliminary. Correct methods of accounting play so large a part in the efficient administration of cities that the question of reform in this direction appears quite appropriate for consideration at these meetings.

It is generally admitted by students of municipal finance that the accounting methods of most cities of the United States are deplorably behind the times, and that similar methods could not be tolerated for a day in any successful commercial corporation. These methods may possibly have met the local requirements when the cities were smaller, but as municipal affairs have become more complex the multiplication of matters to be recorded has rendered these antiquated accounting systems entirely inadequate.

Not in one case in a hundred is it possible to present promptly those periodical statements during the fiscal year which are as necessary for the guidance of city officials as for the directors who manage the affairs of large industrial corporations, and the annual reports of comptrollers and treasurers do not afford intelligent citizens the information they require in order to form an opinion as to whether the administration has been successful or unsuccessful.

Reports are needed which shall render it possible for the public to obtain an insight into municipal finance, and which shall also portray accurately the financial condition of the various classes of cities.

A general balance sheet or a statement showing the financial position of the various legal funds is a rare thing in city reports, while a scientifically classified revenue and expense account, of the city and its various funds was, until recently, almost unknown. The cost of public utilities owned by the city and the correct results of their operation are seldom ascertainable. Correct information is often lacking even as to the amount of uncollected taxes or as to whether appropriations have been over or under expended.

Example of Minneapolis. As the text of this address it is proposed to take the practical example of accounting reform afforded by the City of Minneapolis, the results of which are illustrated in the financial report of that city for the year 1904 (a copy of which you have before you).

Minneapolis was one of the first cities to realize the importance of introducing into its various departments comprehensive methods of accounting, and the financial report for 1904 (though by no means perfect), is of more than local importance in that it exemplifies certain principles of accounting which, if generally adopted, would considerably assist in the solution of some important financial problems in city government and finance.

The report is based on a system of accounting devised to comply strictly with the requirements of a complicated local charter. In accord-

ance with the special desire of the city council it also follows the classification of expenses called for by the uniform system of municipal reports and statistics adopted by the United States Census Bureau.

Results of Inadequate Accounting Methods. Prior to the installation of the new system, the accounts of the city were kept strictly on a cash basis, with the result that they drifted into great confusion.

In order that the experience of Minneapolis may be available for others, the folowing remarkable examples are given of the result of this method of recording cash trasactions only:

(a) The deferred assessments which stand in the balance sheet at over $1,000,000 did not appear anywhere on the books of the city, while the uncollected taxes—of which only a memorandum was kept—were stated at some $376,000 greater than the amount shown by the detailed tax lists.

(b) It was impracticable to ascertain from the books what property was owned by the city or the cost thereof, and no reliable figures could be produced to justify the present indebtedness of nearly $10,000,000.

(c) While the accounts of the city were kept on a cash basis and the liabilities were dealt with only when paid, it was impossible to tell from the books the exact position of any of the fund created by the city charter. An examination of the books by public accountants brought out the fact that there was a deficit in several of the funds perhaps the most startling example being that of the permanent improvement revolving fund amounting to over $560,000.

This fund was created by means of a bond issue for the purpose of enabling the city to make certain improvements, the cost of which would be recovered by special assesments spread over a term of five years.

The city charter requires that as installments of assessments are collected the money shall be used for further improvements of the same nature, which will in turn be assessed. As the installments are collected they are to be again expended, and so on—hence the name "Revolving Fund."

For the fund to be kept intact there should always exist assets to offset the liabilities. These assets should be made up of:

(1) Installments of special assessments not yet due.
(2) Special assessments due and uncollected.
(3) The cost of uncompleted improvements which on completion will be assessed against the owners of abutting property.
(4) Supplies on hand purchased through the fund.
(5) Cash on hand applicable to the fund.

It will readily be seen from the number of elements which constitute the fund that no proper accounting can be had if only cash receipts and disbursements be dealt with and no account taken of the assets which will be ultimately converted into cash applying to the fund.

The necessity will also be recognized of agreeing the special assessments levied with the actual cost of the improvements. No complete cost

system was kept in the engineer's department nor, in fact, was there any connection between the comptroller's and engineer's books.

There was no means of ascertaining that the actual cost of the improvements was assessed, nor whether all the assesments were collected and the proceeds turned over to the treasury.

This method of accounting was carried on for many years, until at last the city officials were confronted with the fact that there was not sufficient cash left in the fund to provide for necessary current improvements, and it is impossible at this date, without a lengthy investigation into the transactions of past years, to say how the deficit arose.

(d) A number of appropriations were over expended, but the fact was not disclosed by the old system of accounting. For example—Liabilities for street lighting were incurred during the year 1904, amounting to $226,940.10 as compared with an appropriation for this purpose out of the current expense fund of $200,027.00, thus leaving liabilities of the 1904 administration to the extent of $26,913.10 to be met by the next administration in 1905.

To relate the difficulties which had to be overcome in order to bring order out of this chaos would be out of place, but from the above remarks it will be seen that one of the main objects of the reform was to abolish the old cash system and replace it by a system which would continuously record all income arising from tax levies, water rents, etc., and introduce all obligations incurred on account of purchases and expenses as they accrue to be carried as assets and liabilities respectively until collected or paid, or otherwise properly disposed of.

The deduction should not be drawn from the above illustrations that the financial arrangements of Minneapolis have been more than ordinarily lax. Examination of several other cities has shown that even greater financial confusion frequently exists, and it is believed that similar experiences might be expected in a majority of cities of similar size.

Check on Revenue and Expense. In a city of the size of Minneapolis, one of the essentials of a system which is to afford a check on the collection of revenues and on the incurring of expenses is the proper recording of every bill immediately a demand in favor of the city comes into existence, and of every requisition for expenditure as soon as it is authorized.

If this recording be systematically attended to by a competent comptroller the information can be used as a basis of account books showing the city's resources and liabilities and should afford the means of preventing waste through carelessness or graft.

These books will contain all the revenues which pertain to the year, and the actual expenses incurred during the year for current administrative purpose, irrespective of whether such revenues and expenses have been actualy collected or paid. Thus, the taxpayer of one year will not be made to pay the obligations which ought to have been met out of the income of the previous years, nor will it be possible by the holding back

of claims over the close of the fiscal year to throw the necessity for an increase in taxes on the next administration. At least, if these conditions do arise they will be disclosed by the acounts and should be reported by the comptroller to the taxpayers in his published annual report.

Centralization in Office of Comptroller. Much discussion has taken place as to the scope and power of the comptroller; whatever doubt there may be as to the advisability of giving him power to interfere in questions of policy or administration there can be no doubt as to the wisdom of concentrating in his hands the departments of finance and accounts, in order that the accounts and reports of all sections of the city government shall be in accord.

The general accounting system in the comptroller's office should embrace the financial records of each of the departments which incur expense or to which income accrues and which keep books of accounts. These in turn should fit in with those of the comptroller. This coordination of departmental records with the general system is particularly needed in the case of the department of public works when a city undertakes its own construction, otherwise, as has already been pointed out, there is risk of confusion between the special assessments and the cost which they are supposed to cover.

Such an agreement can readily be arrived at if the comptroller adopts a system of governing accounts with the various departments, charging the several departments in total with the expenditures incurred by them and leaving the detailed analysis or classification of these expenditures to be kept on the departmental books, subject to his audit.

The process of introducing methods centralizing authority necessarily involves a vast amount of labor under conditions by no means pleasant. The heads of the departments usually appreciate the necessity for reform in all other departments except their own, and their jealousy of their own dignity and resentment against any suggestion of supervision, even in accounting matters, render the work of weaving together the old disjointed systems of the various departments a difficult matter.

It is fair to say that in Minneapolis, after the reforms had been thoroughly explained and understood, they were cheerfuly adopted. The changes were made without confusion in the conduct of the city's affairs and the detail operations of the new methods have since been carried out without friction.

Economies to be Effected. The question will naturally be asked whether economies are likely to have been effected by the institution of the new system.

So far as the actual expense for clerical help is concerned there may be no saving. Considerable economy can, however, be effected through the placing of the means of supervising the expenditures of the various departments and the collection of revenue in the hands of a capable and honorable comptroller, who will be in a position to detect fraud and graft and to supervise the collection of revenues which, through carelessness or fraud, would be otherwise lost to the city.

In the case of Minneapolis it may be safely stated that, owing to the closer supervision which the new system renders possible, and the consequent reduction in losses through uncollected revenues and the elimination of erroneous duplication of the payment of claims, the revenues of future years will eventually be found to have increased considerably over those of previous years.

If the system be properly carried out it will be impossible for any shortages similar to that in the revolving fund to occur again, and the close supervision will have a healthy effect on those responsible for collecting and disbursing the revenues of the city.

General Balance Sheet December 31, 1904. In the light of the elementary principles of accountancy dealt with above, viz.—the recording of revenue and expenses and the centralizing of control in the office of the comptroller—the main features of the Minneapolis balance sheet, December 31, 1904, may now be pointed out.

It will be noted that this statement which exhibits the financial position of the city as a whole is divided into two sections. The upper section contains only the capital assets and liabilities, *i e.*—the fixed properties, the current assets to be ultimately converted into fixed properties, the sinking fund assets, the bonds which will ultimately be liquidated through the sinking fund, and the certificates of indebtedness and accounts payable arising out of the acquisition of fixed properties. The difference between the capital assets and capital liabilities is the capital surplus and represents that portion of the value of the fixed properties which has been acquired by the city out of taxation.

The lower section of the balance sheet includes only the current assets and liabilities, *i. e.,* those applicable to the expenses of administration and maintenance and not to the acquisition or improvement of fixed properties. The difference between these assets and liabilities, which is shown as the revenue surplus, represents the unexpended portion of the revenue of the city and is represented mainly by uncollected taxes.

A common defect in the reports of even those cities which publish ample data is that the information is so scattered and badly referenced that it is almost impossible for a layman to put together a comprehensive statement. It should always be the aim of the comptroller to present a set of accounts which can be readily understood by the average business man.

This has been accomplished in Minneapolis by the presentation of a general balance sheet in the ordinary commercial form—supported by a columnar statement showing a condensed summary of the assets and liabilities of each distinct legal fund. The reference on the face of the general balance sheet indicate that all the items grouped under the different heads are given in detail in subsequent tables.

The financial statement of funds immediately following the general balance sheet shows the segregation of the assets and liabilities between the specific legal funds to which they apply. The totals of this statement can readily be traced to the general balance sheet.

Classification of Capital Assets. In a city balance sheet it is desirable, if possible, to state the cost of all the serviceable property (that is, the property which is fulfilling the purpose for which was intended), classified under its main headings, with detail exhibits showing the cost, the present reproductive values and the depreciated values.

In actual practice some difficulty may be experienced in obtaining cost values of the permanent assets, and in many cases it may be necessary to take appraised values as a starting point. Such was the case in Minneapolis. The information as to the cost of fixed properties could not be obtained owing to the crude methods of accounting heretofore existing, while the present reproductive and depreciated values could not be given owing to the absence of a reliable appraisal, that made by the special committee not being sufficiently complete for the purpose.

It must be borne in mind that the balance sheet of a city cannot be read in the same light as that of an ordinary trading corporation. The main object of the balance sheet is not to show the possibilities of realization, but rather to afford information on administrative questions. The introduction, therefore, of the capital assets and the bonded debt of a city does not imply the possibility of the realization of city properties with a view of liquidating the debt in the commercial sense; neither can the current assets be assumed to offset in total the current liabilities in total, inasmuch as the distinction of funds must be maintained.

It is not to be assumed, however, that the administrative purpose is the sole detriment in fixing the form of the balance sheet.

One of the objects of the balance sheet should be to show bondholders and taxpayers what assets (realizable or unrealizable) are to be set against the debt.

For this reason the capital assets have been classified on the Minneapolis balance sheet so as to show:

(a) The property which could be sold, if desired, without interfering with the facilities already enjoyed, such as water works.

(b) The property which might be sold without hampering the city administration, but the disposition of which would involve a loss of convenience, such as parks, public buildings, etc.

(c) The property which it would be impossible for the city to sell under any circumstances, such as bridges, sewers, etc.

This classification has in the case of several cities found great favor with bankers in considering the placing of bonds.

The precise classification of the capital assets is not, however, of very great consequence, and if it be felt that the distinction between the second and third class set out above is somewhat fanciful the following alternative classification is suggested: (a) Public Industries, (b) Schools, Parks, etc., (c) General City Property.

The division of the bonded indebtedness into classes to correspond with the fixed assets is desirable where possible, but inasmuch as the records of Minneapolis do not show out of which bond issues the various

properties were acquired, and also as the value of the fixed properties are based on a valuation and not on actual expenditures this division was found impossible in the case of Minneapolis.

Other items in the balance sheet do not call for special comment inasmuch as details are given where necessary in subsidiary exhibits.

The liability for interest accrued but not due on bonds has been omitted for the reason that the tax levy covers only the interest falling due within the year, and it was felt that the assets and liabilities should bear some relation to the revenue to be received for the acquisition or discharge thereof. Had the liability been brought into account it would have been proper to have anticipated an equal amount of the income of 1905 which would have been carried as a deferred asset in the balance sheet.

General Revenue and Expense Account. The General Revenue and Expense Account appearing in the Minneapolis report sets out the revenues and expenses classified according to the various functions of city administration in accordance with the plan adopted by the census bureau. Elsewhere in the report the revenue is distributed over the specific legal funds to which it applies.

No comment is necessary on the various headings of the revenue and expense account, but it may be pointed out that by means of subschedules the various classes of expenditure may be detailed so as to show, if desired, the name of the party to whom the smallest item was paid, so as to satisfy those taxpayers whose only desire is to know "who had the money."

Waterworks Revenue Acount. The Revenue Account of the Waterworks, which is the only revenue yielding property of the city, shows an operating profit for the year of $98,108.48. This operating profit, however, is arrived at without making any charge for interest on capital invested or for depreciation of plant, and before taking credit for water supplied to the various city departments.

It would be difficult, if not impossible, under the law of Minneapolis to incorporate as a part of the general system of accounting a revenue and expense account for the waterworks department as it should be, that is, as an independent concern, or to present a balance sheet exhibiting the surplus which would have been accumulated had the law permitted.

The city charter specifies exactly what should go into the waterworks fund and what should be paid therefrom. Nothing is mentioned regarding interest on bonds nor repayment of capital, and therefore it would be illegal to reserve anything from the waterworks income for this purpose.

The provisions of the charter need not, of course, prevent a memorandum account being prepared to show the operations of the water department on the same basis as if it were operated by a company, but unfortunately no information was available as to the quantity of water used by the fire and sprinkling departments, and this fact precluded the possibility of preparing such an account.

Correct Accounts Should Lead to Reform in Administration. In cities possessing complicated charters which create numerous legal funds for various purposes, it is a difficult matter to make the system of accounting conform to the classification of the uniform system of reports adopted by the census bureau, on account of the fact that this classification frequently conflicts with the local law.

The classification of the census bureau, however, has been devised after much thought by some of the leading economists of the country, and the demonstration afforded in the Minneapolis account of the conflicting points should prove most useful in the event of an amendment and simplification of the city charter.

For example—in Minneapolis, street repairs and grading are paid for partly out of the permanent improvement fund and partly out of each of 13 ward street funds. Street cleaning and snow and ice removed are also paid out of each of the 13 ward street funds, while each of these funds is available for the purchase of equipment, buildings, etc., for the use only, however of such wards as pays for it; that is to say, the funds of one ward cannot under the law be used for the purposes of another, nor is property and equipment purchased from the funds of one ward available for the use of another ward.

All the funds referred to are raised by special tax levy at different rates for different districts or purposes and must, by law, maintain their distinction.

The charter urgently calls for amendment in the direction of consolidation of these numerous minor funds.

When amendments of a city charter are under examination it will often be found advantageous to consider also whether the scheme of city administration cannot be simplified by so arranging that distinct functions of government should be performed by distinct departments or at least that one department should not perform duties which are usually accepted as belonging to another. For example—the bulk of the expense on "public highways and sewers" in Minneapolis is controlled by the engineer's department (which corresponds to the board of public works of other cities), but an item of $37,330.91 for refuse collection and disposal was expended under the authority of the health department and paid for out of the appropriation of that department.

Without here entering into a discussion as to whether the collection and disposal of refuse should be looked after by the department of public highways and sewers, or by that of protection of life, health and property, this lesson may be indicated, viz.—that on the occasion of a charter revision the light thrown by scientifically drawn accounts on the law on the one hand, and the form of city administration on the other, forms a valuable guide in reform.

Uniform Reports. In conclusion it is urged that cities when considering changes in their accounting systems or amendments of their charters should carefully study the census bureau forms and booklet, with a view

to taking their share in introducing a uniform system of presenting municipal reports.

Great benefit would be derived from the general adoption of a scheme which permitted each city's experience to be compared with that of other cities. Such comparisons, if intelligently made and used by energetic reformers, would throw considerable light on such questions as to whether a city was being administered honestly and economically or dishonestly and extravagantly, and a comparison of the net existing assets would frequently explain large variations in the rate of tax levy between cities whose geographical and physical conditions were not dissimilar.

For the use of the administrative officers in the management of cities' affairs such comparisons should be as valuable as the comparisons of the accounts of one railroad with those of another are found to be by railroad managers.

From the point of view of a single city, a system framed to meet the local legal and administrative requirements and reports properly drawn up therefrom would probably furnish the executive officers of the city all the comparative statistics necessary for the economical administration of their own city, and accounts could be furnished the tax payers in such form as would enable them to compare the efficiency of one administration with that of another, but they would afford no means of judging of the economy or efficiency with which the city's business is transacted as compared with other municipal corporations which is the object sought by uniform municipal accounts.

MR. REIMER: This paper, and the discussion that preceded it, has been highly interesting to me, as no doubt it has to all of us.

I have only a little bit of a city, and ten years ago I was placed in charge of its street and sewer departments, not only as city engineer and street commissioner, but I had entire charge of those two departments. There had not been any kind of bookkeeping in either of those departments before I took hold of them, and I was a little surprised today to learn that I had anticipated some of the things which have been proposed here.

Our friend from Chicago, Mr. Grosser, has told us that now reports have to be made every day; well, I instituted just such a condition as that in our city just ten years ago, and have always found it to work well, and to be of the utmost advantage.

In our little place there are now about twenty-five or twenty-six thousand people, and we have thirty or forty miles of paved streets altogether, and a separate system of sewers. Every day I have a

report handed to me from the foremen of the different departments. Those reports show the work that was done and the number of men employed doing it, so that we know the whole thing straight through. This is all ledgerized, and the result of the system is that I am able to turn to almost anything that has been done during the past ten years and be able to tell you all about it—when it was done and what it cost. I can tell you what has been done on any particular street in the way of sewer maintenance, or street maintenance, or improvements of any kind.

While our system is far from being as perfect as our friend from Chicago suggested such a system ought to be, still, at the same time, I am satisfied that in some parts of it we are ten years ahead.

THE PRESIDENT: As I said at the opening of the meeting, the discussions will sometimes bring out more points than the paper itself, without any detriment whatever to the paper, but, on the other hand which enhance the value of the paper. I hope that each and every paper will be discussed as thoroughly as the time at the disposition of the Society will permit.

We now come to the report of the Committee on Municipal Franchises. Mr. James Owen is chairman of this committee.

MR. OWEN: I found upon looking into the franchise question that there were two ways of looking at it, and two ways of handling it. One was in the way of the collection of data, and the other in the way of just giving conclusions.

I will simply allude to what may be considered the principles governing municipal franchises.

The committee has had two or three meetings in connection with this matter, and has delegated me to make one part of the report. Mr. John R. Barlow has a supplementary report to make, and when the reports have been presented to you, we will offer you our conclusions for your consideration.

MUNICIPAL FRANCHISES.

BY JAMES OWEN.

While the existence of municipal and other franchises is practically as old as the government, the subject until lately has not been one of particular general interest and attention to the matter has been confined to the special municipality in satisfying its peculiar wants. With the growth of the country, however, and the enormous expansion of municipal development the casual want of the past is now substituted by the universal need of the present.

To properly appreciate the gradual growth of the franchise problem it will be proper to note the specific items for which municipal franchises or charters have been asked and granted, and how they have been granted, and in this category will be included items, such as turnpike roads, that may hardly be considered a municipal development in the ordinary meaning of the word municipality, but they can not be consistently ignored.

It must be understood also that it would be practically impossible for one man to keep track of all the ramifications of the franchise problem on this continent, and specific allusion will be made to the section with which the writer is most intimate, viz:, the metropolitan district of New York, but with its immense population, different states and different municipalities, the varied practices of that district may be taken as a sample of the whole, and what variation exists may be safely left to other members of this Society to dilate upon.

The particular items for which municipal franchises are granted are turnpike roads, water, canals, steam railroads, gas, horse car roads, steam heating, electric light and power, telephones, electric roads, surface, elevated and depressed.

Objections may be urged to the inclusion of steam railroads or canals in the above category, but their existence is so interwoven with municipal growth that they must be considered a factor in the discussion, and, furthermore, the steam railroads are becoming more and more a subject of municipal jurisdiction, both in the readjustment of lines and grades to the development of a city or town, and also in the constantly increasing extensions demanded for the collection and distribution of freight.

Taking the list as above, it will be noted that four of the items can hardly be considered as live subjects, viz: canals, turnpike roads, horse cars and steam heating, and these can be relegated to the past with the passing inquiry as to how many of the live items of today will soon be considered absolutely out of date within the next fifty years.

Looking back, however, and studying the growth and development of each one in the above list, it can be noted that the crucial point of municipal franchise granting was coincident with the introduction of electricity, and until that period arrived the municipality was but a small factor in the franchise question. Its permission was hardly asked, and while it was willing to approve any improvement paid for with extraneous

capital, the returns to the capitalist up to that time were very uncertain, often meagre, and in many cases disastrous. In a few large municipalities the horse car paid dividends on their stock, but in many other cases it was difficult to meet interest on bonds and also to pay for extensions. The same rule applied to gas and water, but with the introduction of electricity the whole problem of municipal development seemed to change, and at the same time, or probably three or four years later, the citizens themselves began to sit up and take a little notice themselves of the situation, and today the best way of handling the problem is the subject of very grave solicitations.

From the early inception of the government all franchises were originally special grants by the legislatures of the different states, and these grants were practically monopolies. The idea of the people of that time was to encourage development through private capital, and every inducement and sacrifice was made by them to attain the desired end. In many cases the private capital was supplemented by drafts from the public treasury when failure seemed imminent, then, as the country grew and satisfactory return was received from previous investments, capital became bolder, made further invasions into the realms of municipal development, built water works and gas works and horse railroads, all with practically the tacit consent of the municipality affected, but with powers granted by the state which were often sufficient to overrule the local authorities, until suddenly a wave of protest swept through the country and general laws were passed authorizing with due and proper procedure the formation of the different companies for the different purposes with complete municipal control, with incidental state supervision.

It is interesting to note that in 1827 a charter was granted by the state legislature of New Jersey to build the Morris canal with a provision of reversion to the state at the end of a certain period. The period has not yet expired, yet it is a fact that the canal is useless, a burden to the owners, and it will be abandoned as soon as a satisfactory agreement can be arrived at. This case is one of the early germs of municipal ownership.

THE METROPOLITAN PROBLEM.

To more properly appreciate the problems of municipal franchise as a whole it will be necessary to take up each individual item in the above list and make a careful analysis of the peculiarities of each, with the trend of sentiment at present prevailing, and also with a regard to the future as is allowable with the average human foresight. When we note four items of our list wiped out of consideration it is certainly worthy of consideration what of the remaining may also suffer annihilation. There are also certain other governing principles affecting the franchise problem which must also be considered.

First—The homogenity of any community as to whether franchises are inherent or intramural, for example: New York city, with a population of 3,500,000, under one municipal control; Chicago, with a population of

2,000,000, under one municipal control; the New Jersey section adjacent to New York, with a population of 1,000,000, composed of 138 different municipalities; Boston and suburbs, with a population of 1,000,000, with twenty-five to thirty municipalities. These cases are cited as extreme, but they show the variations in conditions.

Second—Character of population—business, manufacturing, farming or residential.

A. Is business concentrated in one district or scattered?

B. In manufactures the proportion of labor to output is important.

C. Are residents scattered or congested?

Third—Topography and extent of the municipality.

Fourth—The average wealth taxable and actual.

Having outlined the subjects of the franchise problem, and also the principles affecting it, it will now be in order to make a specific application of one to another, and from that it will be possible to make deductions general in character, which may be of advantage.

TURNPIKE ROADS.

The era of private turnpike roads having passed, small allusion need be made, except to cite that they were all legislative grants, and on their abandonment almost uniformly reverted to the public; in some cases they were bought out by the local authorities; in others by the state, but the doctrine of municipal ownership in this case is well exemplified.

WATER SUPPLIES.

The practice of water supply on this continent is very varied. No one rule can be laid down for its application except that all large cities generally own their own supply, Indianapolis, Denver and Paterson being notable exceptions. The tendency of public opinion is, however, toward municipal ownership, and it can be noted that private plants are being condemned or bought out in every direction. On the one hand new companies are being formed in rising or growing towns, and at the same time other growing towns are putting in their own plants.

The topography and location of any given town is an important factor in its decision. A moderately large town near a large river with good water can easily afford to put in its own plant. Another town located near head waters would have to spend a larger sum for the same improvement, and it also occurs that a community is entirely dependent on an outside source for its supply. This source may be pre-empted by another municipality, so it is forced to buy. Then again the financial condition of a town may force it to get its water from a private company, or the inhabitants may be unwilling to raise the money . A water franchise as a rule is a permit to furnish water to a community at a given price paid by the consumer, with a bonus paid to the company for fire protection, known as hydrant rental. This varies from $60 to nothing per year, and in no case is it monopolistic. Practically, however, there is little duplica-

tion. The great onus in all water plants is to provide for extensions, which largely eats up the profits of private companies or necessitates continued increased capital, and the tendency of the courts to ignore franchise values in condemnation is having a deterring effect on private capital in water construction, so it is safe to premise that as time goes on the franchise problem in water supply will cease to be of moment. The duration of water franchises is as a rule indeterminal. The power of condemnation seems to be the solution of troubles between the company and the community.

The consumption of water per capita seems to be somewhat of a factor in the relation of company to municipality. When a variation of 200 gallons a head per day in municipal ownership to 25 gallons a head per day in private ownership is observable the problem of waste and free water arises in the franchise arrangement. Undoubtedly a large proportion of the waste is due to municipal neglect, but the doctrine of unlimited water is still a pervading sentiment and will not down.

As to the limit of the franchise for water service, very little discussion seems to have arisen. Where a company installs a plant and supplies the water to the consumer the franchises are generally perpetual, subject to a periodical renewal of the contracts for hydrant rental, and, of course, subject to condemnation. Where, however, a company furnishes water only, and the municipality delivers it to the consumers, the contracts are generaly terminal, and run from five to twenty-five years, with or without the privilege of renewal. Where a section is composed of many different municipalities it sometimes occurs that a company organized in one town will obtain its water from a company with a franchise in another town, and the periods of their contracts may vary, showing that there is no question of any prospective termination of their franchises.

CANALS.

Canals for navigation, owned by private corporations, are practically things of the past, and there seems little prospect of any future development in this line. Many of them have been abandoned and the land has reverted to the owners, others have been acquired by the railroad companies and tracks laid along or in them, and a few are still extant, but are in a condition of desuetude. Where abandoned the charters have lapsed, as no provision had been made for reversion, and where changed into railroads probably enabling acts were passed so that the transfer of title might be legal.

STEAM RAILROADS.

As before noted the relation of steam roads with municipalities has not been generally close. All roads were built under special acts and later by general acts of the legislature, and all charters were perpetual. The control of the municipality was nominal, except in police jurisdiction, as to speed and protection of crossings. Public sentiment had but little

influence in their management, as each road was presumably managed in the interests of the stockholders with the idea of obtaining the greatest revenue. Of later years the problem of grade crossings has brought the railroad company and the municipal authorities into closer association, in fact into practical partnership, yet any suggestion of management in the number of trains, rates of fare, etc., has been rarely considered a matter of adjudication by the authorities, even though they have contributed a goodly amount of cash in their construction, and it is curious to notice that while the municipal authorities exercise careful and anxious supervision over the street railroad tracks they carefully ignore any matters relating to the steam roads. The United States government has its national committee and many of the states have their state commission, who are presumed to have general charge of matters relating to public welfare in railroad management, yet their existence is not pronounced.

There is one point that does affect every municipal community most profoundly, and that is the rate of fares charged by railroads, and its effect upon the growth and progress of sections through which the roads run. The railroad practice of today is the practice established in the early days of railroad development, there is little prospect of any change, it has never been changed and seemingly this point can be more aptly alluded to in discussing street railways.

The other point in which the municipality comes into touch with the railroad company, and on this point so much variety of practice exists that no rule can be laid down, is that it is essential in all manufacturing cities to have trackage facilities through and across public streets to connect the factories with the main line. These facilities are optional with a community to grant or not, and according to the emotions of the inhabitants of the city they are granted or rejected. Their construction in all its details is subject to municipal control and their permanency is dependent upon municipal will. These grants can not be called franchises, but are merely permits, but the companies collect revenues for their use and never pay any part to the city. In certain large cities lately the reconstruction of terminal facilities has been a matter of municipal supervision, and for the permanent privilege of such construction an annual rental is paid into the treasury of the city. In one case, strange to say, the city itself raised the money and built the works and propose to collect it from the company in the future.

GAS SUPPLIES.

The construction of gas plants is almost uniformly confined to private corporations, only one noted exception existing on the continent, of a city owning its gas plants, and the result has been anything but satisfactory. Gas, like water, was originaly introduced under special charters and later by general acts, and the service is usually under complete municipal control. The quality of the gas and the price are regulated, but there

is no limit to the franchise as a rule. Contracts for lighting the streets are made for a longer or shorter period, but even the termination or lapse of such contract does not interfere with general consumption. With the recent practice of abandoning small plants and concentrating the manufacture in larger units the connections of a company may run through many different communities, and the contracts for public lighting vary. One town may be lighted with gas, the one adjacent with the same service will use electricity and make no contract for gas. Others will use both mediums for lighting, but like water, there is no positive monopoly.

HORSE CAR AND ELECTRIC ROADS.

While this subject is defined under two heads, it would seem wiser to include them under one heading in this discussion, as the electric roads of to-day are the resultant of the old horse car roads now nearly obsolete. In discussing franchises of this character, where the surface of the public highways is segregated to a certain extent for private use, the principle of usurpation appears an issue. In the original turn-pike grants an old highway was monopolized by the company or a new one opened by them. The public could use every part of this highway by paying toll, and no discrimination existed. Canals and railroads bought their own right of way, but with the laying of iron or steel rails on a public highway an entirely new principle was inaugurated and sanctioned by law, viz., that of private ownership on a public highway. It would seem to the layman's mind somewhat inconsistent for the authorities to grant special rights to a private corporation in a strip of land presumably deeded forever for public use, but street railways, whether propelled by horses, steam, electricity or gasoline, are a fact in our body politic, and are one of the most important factors in our daily life.

Originally, like other charters of that time, horse railroads received their grants from the legislature specifying the route, and were perpetual. Municipal control was incidental and always favorable, and a horse railroad was always favored by the communities through which it passed. The rate of fare was decided by the company as well as the timing of the trips. The rails were laid as much as possible to keep general traffic away. Looking back, without present knowledge of municipal transportation, it must be admitted that horse car travel was a miserable failure, yet it filled a gap in the only way that existing engineering knowledge could overcome, and the people at large were seemingly favorable, as protests, if any, were of the silent order, due to the fact, probably, that the average horse car company was making but little money and it was useles to kick anyhow.

The principle of private use of public highways was, however, firmly established. The courts by decision, gave the right of way to horse cars over other vehicles on their tracks, prohibited wagons from stopping on tracks, all this being in the line of the general public convenience.

Prior to the introduction of electricity for traction purposes special charters generally ceased to be given and the municipal authorities under statutory powers granted charters to horse railroads and the same privilege has been followed in granting franchises for electric roads.

The introduction of electricity for street propulsion filled a long felt want, and its popularity by the public and acceptance by the financial element has lead in many localities to serious and complicated results, and the complication arises in some cases from trivial causes, and to appreciate this let us theorize for a few minutes.

If in the early fifties a perfectly smooth pavement had been introduced and laid in any given city, and at the same time a complete motor car had been designed and put in use, the question of laying a pair of iron strips on a highway to carry a car would not have been considered. If in the substitution of electricity for horse-power twenty years ago a complete self-propelling car had been invented the trolley pole and trolley wire would not have come into use, and curiously enough the trolley pole has really been the cause of all the present contention on electric traction franchises because it necessitates a further usurpation of public rights on the highways by the erection of poles, and this usurpation has engendered more protest and friction. So to really crystalize the present contention on the franchise question in this subject, it is due to imperfect engineering, and it further emphasizes the fact that with the inevitable advance in engineering knowledge the premises and arguments of to-day may be in a few years complete nullities, and every franchise, whether perpetual or fifty or twenty-five years' duration, may easily lapse from non-use.

The motor car of to-day bids fair to control the transportation of the future if the municipal engineer supplies the needed perfect pavement, which he can if public sentiment will let him have the money.

Considering the traction franchise condition as it is to-day, a small proportion of these franchises are perpetual in name, some with permission for periodical renewals, but the general rule is a limited franchise, varying from twenty-five to fifty years, but in no case has municipal ownership been adopted. The states of Massachusetts and New Jersey are the most notable cases in which the principle of perpetual franchise is in vogue. In the former a legal restriction is imposed in the organization of the company by insisting on a paymtnt in cash for every dollar's worth of stock issued, thereby preventing undue watering of stock, and in New Jersey the granting of unlimited franchise has probably ceased, as public opinion at present is too decidedly opposed to such a practice.

The trend of public sentiment on the growth of street railway travel is very curious. The writer has in mind an old horse car line between a large city and a suburban town of about 8,000 people. There was a steam road between the two places which carried the bulk of the travel. The horse cars ran every twenty minutes, took forty-five minutes for the

trip, most of the time were half filled, and the fare was ten cents. Without warning the company operating the road reduced the fare to five cents, and shortly afterward made application for a trolley franchise, unlimited as to time and with the customary clauses, keeping the fare at five cents without transfers. Public sentiment was so keen for the new improvement that the franchise was granted without demur and the result was that the trolley line ran cars every ten minutes, took twenty-five minutes for the trip and the cars were crowded to the doors, while the steam railroad was practically obliterated and everybody was happy. Three years afterward, with extraordinary expansion elsewhere a growing insistment of better terms by other municipalities, this very community could not find words too hard in condemning their own authorities for letting the trolley company get the best of the town as it did, and this growing sentiment in all communities in insisting on better terms from trolley companies has practically established now what might engineeringly be called an equilibrium and comparatively little is now being made in trolley extension.

This condition of affairs is detrimental to all communities, but, of course, is satisfactory to the companies owning the existing lines. The travel increases on their road, in many localities it is congested and further relief is not in sight, and, seemingly, if adequate provision is not made for future extension on satisfactory terms to both the public and the capitalist, travel will have to be forced back into the old channels; viz., the steam railroad and the highway.

One of the most curious facts relative to general travel is the rate of fare the public is willing to pay, and in considering this factor let us appreciate what is the practice to-day.

Ordinary steam railroad travel, two to three cents a mile average, thirty miles an hour.

Commuter steam railroad travel, one cent a mile average, thirty miles an hour.

Average electric travel, three-quarters to one cent a mile average, fifteen miles an hour.

Average electric travel in large cities, to one cent a mile, fifteen miles an hour.

Noting another factor in the case, that the American public does not consider any coin under the value of five cents as of paramount importance, witness the lack of appreciation of the three-cent fare in Detroit, and also note everywhere the general dissatisfaction with a six or seven-cent fare.

Now, what are the practical results of the above figures in their use by the public? Of course, limiting the investigation on steam railroads to a short haul, not including lengthy trips, in fact, presuming it all to be municipal or intramural travel, they may be summarized as follows:

Two to three cents a mile, light travel, short trains at infrequent intervals, with light loads.

One cent a mile, commutation. Every railroad with a cummuter patronage is congested and is forced to spend enormous sums to accommodate increasing travel.

Three-quarters of a cent a mile, trolley. Travel increasing by leaps and bounds, in many cases is congested.

The same statement applied to city travel.

It is, therefore, apparent that the general public would sooner pay a lower fare with a lower speed, the element of time not being so apparent, and the most extraordinary point in this whole matter is the fact that the steam railroad companies, having adopted the system of low rates for commuter travel, do not further extend the practice into their general travel.

A case in point may be cited where a steam railroad in 1855 established a rate of eighteen cents between two stations, the distance being five and a quarter miles. This rate is still in vogue, and the trolley line parallel with it charges six cents and extends a mile each way beyond the stations. The result is the receipts of the eighteen-cent fare are very meagre and the trolley cars are overcrowded. The difference in time is about ten minutes.

These citations raise the point at once whether, in addition to the control of street railways by the authorities, either local or state, some supervision should also be exercised over the steam railroads in the matter of fares and accommodations.

The old horse car lines were a law unto themselves until they wanted electricity, and the steam lines now have to get municipal consent in the reconstruction of the lines, and the same insistment can be made with them, if the municipal authorities will only take hold of the subject, but so far they have never done it.

Of course there is a great difference in principle between the two systems in the fact that the street railways occupy the public highway, but this is almost universally recognized by the companies paying a certain proportion of the receipts to the city and also paying for car licenses.

THE SUBWAY AND ELEVATED.

At this time allusion can be made to the purely municipal development of elevated roads and subways now operated by electricity. They are not very extensive and the franchise problem is not under discussion. The elevated railroads of New York, Brooklyn and Chicago were built under special acts, with unlimited franchises, and without much municipal control. It is of interest to remember that the Board of Health of the City of New York once attempted to take control, but the attempt was a failure.

The subways of New York and Boston are the two notable instances of municipal ownership, both built by the respective cities and leased to

the traction companies under such conditions that the receipts pay for the interest on the bonds and for the principal for a series of years.

Electric light and power plants, now so extensive in the country, are subject to carrying conditions according to the ideas of different communities. There are two stages in these plants; first, the incipient stage, when the wires are carried on poles, and, secondly, when the wires are located underground. The introduction of electricity being of recent growth, the old-fashioned special charter does not appear and municipal authority over the private companies is complete. The contracts are made for public lighting for a long or short period, and then terminable, and there seems to be a variation from the practice in gas and water in that the franchise ceases at the same time; generally, however, there is a purchasing clause providing for a reversion to the town, and sometimes this is without compensation.

The doctrine of municipal ownership is being extensively practiced in electric street lighting, and the results are satisfactory; but the application as a rule is in smaller cities where supervision is easy. Considerable agitation, however, is being made in some of the larger cities and the results of their operations will be interesting.

Where the wires are put underground generally the company build and own the conduits. In some cities the city builds the conduits and the companies furnish and lay the wires. This point is interesting as maintaining the doctrine of public ownership in the highway.

Power plants are generally an adjunct to the lighting plant, use the same poles and belong to the same company. Independent plants, however, exist in some towns, and are completely subject to municipal dominion.

The municipal ownership of electric lighting plants practically prohibits this source of power, and in many towns this much desirable commodity is not obtainable from this source.

TELEPHONES.

The conditions of installation of telephones are practically the same as electric lighting. First, the poles, and then, as the community grows, subways are used. Telephone franchises are uncertain in their tenure, the telephone system of the country being in limited hands. The absolute tenure of the holdings is a legal problem known more particularly to the owners. Originally there was no limit to their permits. Of later years the public has become more solicitous on the question. The status of the telephone poles, scattered all over the country on the public highways, would be the subject of interesting investigation as to the authority for their erection beyond the consent of the land owner.

The tendency of the future, however, is to put the wires underground and the companies are systematically at work to that end.

These foregoing remarks include all that it is possible to say in the limited space available, and it may now be in order to summarize and

offer a few sugestions for discussion.

Take the list as previously given and classifying them on the franchise basis we have as follows:

Unlimited Franchise: Turnpike roads, water supply, steam railroads, gas, canals generally, horse car roads, elevated roads, steam heating.

Limited Franchise: Electric light and electric power.

Both Limited and Unlimited: Electric railroads, telephone, electric light.

Municipal Ownership: Water, electric subway, gas, in one state.

The doctrine of limited franchise for street railways is now so nearly universally accepted that it bids fair soon to cease to be an issue. Financiers have perceived the trend of the times and are making no special effort to obtain limited franchises, on the other hand they are making no special effort to obtain any franchises that are particularly valuable, and as has been stated the public is suffering.

THE FUTURE.

The doctrine of municipal ownership is really the problem for considering future franchise granting, and in discussing this the first question is, is the public willing to assume the burden and responsibility of control? and secondly, is the public able to achieve as economical an administration as can be done under private enterprise? Municipal administration means political administration and political administration to-day is more one of sentiment and sympathy than that of business. The trend is for the better, but have we arrived yet at the condition where a street railroad system could be run by its political officials without the injection of so-called politics? It is done in Europe and can be done here, but the time is hardly ripe.

The enormously increasing functions of municipal administrations are in the line of pure socialism, probably the ideal condition, but a further assumption should be made with care. Taking the experience of municipal ownership to-day it is found that where a minimum of labor is required for administration, such as water supply and electric lighting, very sucessful results are obtained, but when the control of vast numbers of men is vested in a municipal board, however perfect its membership, the economical end is sometimes lost sight of and therefore it would not be a paying investment.

One happy solution of municipal ownership is the New York subway, owned by the city and operated by a private corporation. It is financially a success, and gives satisfaction. The proposition of the City of Chicago to purchase the surface lines and lease them is of undoubted merit and further relieves the franchise problem of its present doubtful status, viz: The usurpation of public rights in private ownership.

The doctrine of municipal ownership as practiced in Europe is a guide for future development on our continent, but the dissatisfaction that exists there over the high taxation incident to its assumption is

probably greater than the complaints that are made on this side of the Atlantic, and, furthermore, the power of raising money and the price of it are of potent influence. A very large proportion of cities and towns today are bonded to the limit for absolutely necessary improvements, and to them municipal ownership is a hoped for condition not realizable at present.

The final conclusions of the committee are as follows, dividing the franchise question into two main heads:

First—Those that have control by purchase of their whole equipments.

Second—Those that have facilities in public highways.

Of the first little need be said at this time. Of the second, they are of opinion that all concessions to use the public highways, whether for water, gas, electric subways or car tracks, should be in the nature of permits, revocable at will, or definite periods of duration, and that no legislation should be permissible that in any shape usurped the complete ownership of the public in any public highway.

MR. OWEN: In Germany they are erecting complete trolley lines, and working them without the use of any tracks whatever. They simply have the overhead wires, and the cars travel on the highway. Of course you understand it would have to be a good highway. I understand that the difference in the cost of power is only about twenty per cent, in favor of the tracks.

With your permission, Mr. Barlow will now present to you his supplementary report.

MUNICIPAL FRANCHISES.

BY JOHN R. BARLOW, CITY SURVEYOR.

The subject of municipal franchises has of late years assumed a serious aspect, inasmuch as they are frequently granted without the consent of the civic authorities.

These franchises so given to private corporations by the legislature for rights over, along and under the streets of cities and towns are now so numerous that the streets are no longer under the control of the municipal authorities and steps must be taken in the near future to alter this state of affairs, and in the meantime every application should be contested until the rights of the city are recognized. The principal users of the streets are telephone, telegraph, gas, water electric street railway and light, heat and power companies.

Without doubt in the early days of most cities the civic authorities and citizens generally were only too pleased to grant permission to private corporations to lay pipes for the supply of water and gas, and also to

erect poles for telegraph purposes, but the advent of the electric power has changed the aspect entirely and these companies desiring very extensive use of the streets have gone to the legislature and secured charters from that body which practically gives over the streets to them; it is true there is a proviso in these charters, that the city shall locate their poles, pipes or conduits, but if the civic authorities refuse to do so, then the company has the power to take their own location. This, as you may perceive, places a city in the position of seeming to acquiese in the franchise as granted, but at the same time gives them real power or control. At the present time civic authorities are awakening to the fact that the companies in some cities charge higher rates for their commodities than in others, or that the cost of production should demand, and they are further imbued with the idea that the civic authorities could supply the citizens with the same goods at a rate far below that which they have to pay at the present time, and after serious consideration of the matter are asking for better terms from the companies before definitely taking action to carry out their views.

At the present time companies that were originally in opposition to each other are rapidly becoming amalgamated into one corporation which, having things in their own hands, control prices.

In the City of Montreal there were at one time several companies which secured charters or franchises from the legislature to erect poles and lay conduits for light, power and telephone services, and while they were separate they each erected poles and laid conduits until the business part of the city's streets were completely occupied, but the laying of conduits has in no way lessened the number of poles in the streets, nor has the amalgamation of the light and power companies reduced the number of conduits or poles.

The civic authorities have under consideration the question of constructing a public conduit to take all the wires of the different companies before their systems are extended any further and at the same time remove all the poles which at present encumber the streets.

The water supply question has not as yet been any source of trouble in this section, but when the adjoining municipalities are annexed to the city the question will have to be faced, as all these municipalities are at present supplied by private corporations whose rates, if different from those of the city, *especially if greater,* will have to be regulated.

In conclusion the writer is of opinion that all water and light should be supplied by the civic authorities and that no franchises or charters should be granted to any company desiring the use of a city's streets unless the civic authorities agree thereto.

THE PRESIDENT: The report of the committee is now before the meeting for discussion.

MR. GROSSER: The subject being so important, and the meeting so small at this time that I would move that the discussion of this paper, or report, be held over till this evening or, if you like, till to-morrow, when all the members will be present, and a full discussion will be had on this very important subject.

THE PRESIDENT: The difficulty in the way of your suggestion, Mr. Grosser, is that we have about twice as many papers as we have time for.

Of course I do not want to cut out any discussion, but it seems to me that it would be a bad precedent to allow the discussion of this report to go over when it will interfere with some other paper.

MR. OWEN: I do not know that it is a matter that the Society has to take any definite stand on. The only question is that it is a very live subject throughout the whole country, not only in the United States, but in Canada as well, and there is a great difference of opinion and knowledge on the question. As Mr. Grosser says, it is a very important question, and one that should have full discussion, if any action were to be taken.

THE PRESIDENT: According to the action taken by this Society two years ago any person who is in any way prevented from discussing any of the papers as fully as he may like is invited, and even requested to send a written discussion of the paper to be published in the proceedings. Of course this is not as satisfactory as an oral discussion, but it sometimes happens that we have not the time at our disposal to discuss some of the papers as we would like. Then, on the other hand, there is this advantage in favor of it: a man may not have his ideas arranged in the way he wishes to present them, as soon as the paper is read, and if he takes the time to write out his remarks new ideas may suggest themselves to him.

There is another point that I wish to suggest to this meeting. The program calls for a three day meeting, but there is no reason why we should not make it three and a half, or even four days if we consider it advisable. There is nothing in the Constitution which prevents us from doing this. If we decide on this course it

could be arranged that we postpone matters which seem of sufficient importance to be taken up at the additional sessions.

MR. SHERRERD: Mr. President, it occurred to me from the wording of the suggestion that it is more in the form of a recommendation than anything else, and that it is hardly wise for this Society to take any definite position on this broad subject at this Convention. I think Mr. Owen's paper shows a great deal of thought, and it has brought the subject to the attention of the members of the Society in a way which will make us think more seriously of it. I am speaking particularly for myself now.

It appears to me that it would be the proper thing to insert it in the proceedings as the conclusion of the report. It can be received and the Society in no way bound by it, or bound by any expression of our opinion, then we can act upon the whole thing at a future convention.

MR. OWEN: Our object was to put a conclusion before the meeting. Of course, the meeting does not have to take any action if they do not want to.

MR. GROSSER: This paper is a most excellent one, and gives the basis and development of the present demand for municipal ownership in such a manner that I, at least, feel myself unable to discuss it in a few minutes; least of all do I feel able, at the present time, to discuss the conclusions the committee has reached.

You all know that we, in Chicago, are specially interested in this question, and we are very strong against the granting of any franchise—and here I enter the discussion.

We believe in the great theory and principle that whatever an individual can do the people can do, and do far better than any individual, and if municipal ownership is good in one thing it is good in another thing. If we can operate municipal lighting successfully, as is done all over the country, and if we can operate successfully water plants, as is also done all over the country—we can operate street railway plants just as successfully.

One of the objections that Mr. Owen raises is that political interference and political influence will increase the cost of such

operation. This may be true—it may increase the cost, but even supposing that it does, it would not cost the people a cent more than it costs them now. The difference would be that instead of a large profit being led into the pockets of individuals that profit would be expended in some other way.

As it stands to-day the people are being exploited by those public utility corporations, and we have been paying tribute to them ever since the nation has existed. The question is "shall that be continued in the future?"

In Chicago we have to deal with that problem. The people have declared repeatedly (and at the last spring election by a vote of 162,000 to 32,000) that no street railway franchise should be granted to any company.

We claim, and we prove by the other public utilities that the city owns, that we can, successfully, own and operate public utilities. The last legislature passed a law authorizing the City of Chicago to sell its surplus electricity to private consumers, and at the present time we own and operate a street lighting plant (and Chicago has the largest street lighting plant in the world). We operate 6,000 arc lamps at a cost of $55 per year per lamp. We are still running about 600 lights at a cost of $103 per light.

The authority received from the legislature will be voted upon by the people next November, and preparations have already been made to use the surplus electricity that we have, and, possibly ,to extend the plant.

The city electrician gave me his figures, and he says that we will be able to cut in half the charges of the present companies. He tells me that we will be able to produce electricity at the rate of 77-100 of a cent per kilowatt hour. Of course, the charge for wiring must be added to that, and the cost of this will depend on the distance of the location. The present charge of our companies is from 3 6/10 cents to 20 cents per kilowatt hour, according to the location and distance.

We have been successful in the municipal ownership and operation of lighting plants, and the municipal ownership and operation

of water works and other utilities, and is there any reason why we should not enlarge the list?

We have had the experience of our great intercepting sewer system. In 1898 part of that great sewer system was thrown up by the contractors. The city thereupon undertook to finish the job, and it was finished, and the work done at a cost lower than the lowest contract. The city then wanted to complete the system on the north side, by direct labor, but was enjoined from doing so at the instance of one of the contractors. The matter was fought out to the Supreme Court, and a few days ago a decision was rendered which prevented the city from carrying out the work. The consequence was that we had to advertise for tenders again, and they were awarded at a cost of some $20,000 per unit higher than they ought to have been. The work has begun.

We say that the street railway service has been exploited by those private companies, and I tell you, gentlemen, right here, that the demand for municipal ownership was caused by one man. Somebody said to me that it was "those long-haired, daffy brained fellows who were crying for municipal ownership," but I tell you that is not the case. The famous (or infamous) Baron Yerkes has brought about this demand for municipal ownership. They watered their stock to such an extent that the people became dissatisfied, and when the franchises ran out they were not willing to renew them.

At the present day, under the decision of the Supreme Court of the United States, some 264 miles of track are available for immediate city use. The franchises have been declared run out on track covering that distance, and it is proposed now to take over that part, and to build a system comprising that 264 miles, and extend it later on. It has been proven that it can be operated successfully, and the only difficulties in the way are of a legal nature.

Of course, the owners of the stock in the old companies are doing everything in their power to impede the movement, but we do not know that they will be able to do very much against it.

I remember a paper read by Mr. Spence, the chairman of the council of Toronto. He said that they took over the plant in 1891 and began to operate, and that they paid the old company the full value of the real property and rolling stock, and that within the first three months they not only produced the interest on the investment, but they had a net profit of $45,000. Then voices became loud, and people said that the whole thing was done only so that somebody might get a fat job. The result of this was that the system was changed—a private company took over the property and got a twenty year franchise under those conditions, they had to reimburse the city for every cent expended—they had to take over the property—they had to extend the lines, and they had to pay the city, in the first place a kind of a license amounting to $800 per month, and in addition to that, compensation ranging according to the amount of receipts from five to twenty per cent. Mr. Spence informs us that they have just reached the stage where the receipts of the company are so large that they have to pay the twenty per cent.

Toronto is a city of 200,000 inhabitants, and the street railway receipts for 1904 were $65,000 and they have a good service, but in spite of the good service, and in spite of the profit that there is in it, the general demand is that the city should take it over again when the charter expires in 1911. It is more than probable, I understand, that this will be done when the charter expires.

All this cry of "municipal graft" of which we hear so much is very much exaggerated. We never hear of private graft, because they know how to suppress it.

MR. OWEN: What about the Equitable?

MR. GROSSER: Well, that is another question. You very seldom hear of municipal graft, except possibly in Philadelphia. Still, we must be prepared to admit that there has been a great deal of graft in municipal affairs, and a great deal of corruption. But, let me ask you who causes the graft and the corruption in all cities if it is not the public utility corporations, who go to work in order to secure something for nothing and bribe the aldermen and the city officials wherever they can?

Now, even if political influence would have a great deal to do with municipal operation, I say that the corruption and evil of political influence could not be half so bad as the criminal influence exercised by those public utility corporations sometimes.

Another reason why we in Chicago are so absolutely in favor of municipal ownership is this: We believe that civil servants ought to be under a strict and honest civil service system, and I am proud to say that in Chicago we have a strict and honestly carried out civil service system. The mayor of the city cannot appoint his own brother to an office with the city—except as regards the department heads and the bridge tenders. We have 9,000 employes in the City of Chicago, and they are all under the civil service, and all the work that has been carried out by direct employment, and without the aid of a contractor, has been honestly, well and cheaply carried out. Mark me there. I say that it has been cheaply carried out.

Let us look at the street railway companies in Chicago to-day. In the year 1904 the two great companies received from passenger fares about fifteen million dollars. Their cost of operation and maintenance for the same period amounted to less than eight million dollars, so that they had a surplus over the cost of maintenance and operation of more than seven million dollars, which they used to pay taxes, interest—on what? On the bonds. And then they tried to pay dividends on the immense amount of water in their stock.

There will be no water in the stock if the city takes over the system, and, supposing that the cost of operation of those very roads was not seven and a half million, but ten and a half million dollars, who would profit by the difference between that and the fifteen million? Would the citizens lose anything by it? No. They will have to put their nickel up just the same. Well, who will profit by it? The public at large, because if there is a greater cost (and I am not prepared to say that there will or will not be), but if there is, how can it be explained? City officials of today do not steal money in this country—that is they do not steal directly. You or I very rarely hear of a city official who puts his

hand in the public treasury and takes the money therefrom and puts it into his own pocket. What we do hear of is a case of corruption, or bribery, but not one of theft.

But, supposing they spend more of the profits, they may pay better wages, or they may have shorter hours for the men, and there is no doubt that that will be done. This in itself is a great advantage. Then in addition to this there is the benefit to the general public. Of course there are some who do not care for this. There are a few favored individuals who do not care for money—who have so much money that they do not know what to do with it, but those are not the ones I am speaking of. I am speaking of the ordinary citizen. If the system is taken over the result will be that the immense profits will be cut off a few gilded individuals who have already too much money, and they will have nothing left to do but to go over to London and build a "tuppenny tube," or move to New York and become bloated aristocrats.

I have given you those reasons why the people of Chicago are so strongly in favor of municipal ownership, and why the population is so firm in its demand and will succeed in obtaining what it wants. It will take a little time, and will have to be fought through the courts, but the thing will come and the result will be beneficial to the people.

Having had the experience of Chicago, I do not exactly coincide with Mr. Owen in the final conclusions that he has reached. If I understood him well, he said that a city should not operate anything, but should simply assert the ownership of the public highway. Well, you know in Chicago we have had that cry, "The streets belong to the people." That has been our common cry in five campaigns, and it carried every time. Of course the streets belong to the people, but that is not enough. The people should use the streets, and if they want any utility on the streets they should operate it themselves, and they can do it just as well as they operate the water plants and the lighting plants at the present time. The same thing applies to gas.

It was a sorry day fifty years ago when the legislators gave away valuable franchises to a few men, but if you look into the

matter more closely, you will find out that those men paid for the privileges, and paid high for them, and that they are having to pay higher as time progresses. It is a fact that there is not a state legislature today in this country that is absolutely pure—that is above suspicion—at least, I do not know of one. There is not a legislature in any state today, whether it is the legislature of the state, or the House of Congress, or the United States Senate, if you please, where the great public utility corporations do not entertain very expensive lobbies, and for what purpose? If they have an honest demand, or if they have something to ask for that they deserve to get, why don't they ask for it honestly? Why don't they try to get it without attempting to bribe everybody? The mere fact that they entertain lobbies to prevent proper legislation shows logically that there must be some nigger in the wood pile.

I believe that the civic awakening that we have had throughout the length and breadth of this country during the past five or six years will do much to prepare the people to be ready for good government, if not at the present moment, at least in the near future—and when I say good government, I mean good government in municipalities as well as in states and in the nation.

MR. CHRISTY: It struck me that what Mr. Owens said was that in granting franchises we try to hedge them about with conditions, and when they go to court, the court takes a firm stand on the rights of the capital invested, and while you think that you have a condition which will make them do this, or make them do that, there is that right of capital which crops up and prevents the city from starting things which they think they have a right to start.

It seems to me that the only way is that the city should own the streets absolutely, and control them, especially as regards street railways.

Of course, there are many sides to that question, and I do not honestly believe that any city corporation can operate any public utility as cheaply and as effectively as a private corporation.

I believe that the advantages accruing from what little additional cost there may be is an advantage in favor of the people;

that is, the people have the matter in their own hands all the time, and as far as trying to grant franchises to corporations, and then make them stick to the conditions, why, when you go into court you will find that they get the best of you every time.

The idea that I got from the paper is the importance of the rights of capital, and the hard thing it is to tie the corporations down to just what the people want. The people's ideas of what they want are very changeable, and ten years from now they will be different from what they are today.

MR. GROSSER: Are you a city engineer?

MR. CHRISTY: No, sir, I am a lay man.

MR. GROSSER: What I wanted to ask is this: Is there any engineer ready to admit that in the employ of a private corporation he could carry out his work more effectively or more cheaply than he can in the employ of a city?

MR. OWEN: That is a close question.

MR. TILLSON: There was one thing that came to me as Mr. Owen was reading about the motor used in England, and it occurred to me that it might be of interest to the members.

Last spring I was talking with the mechanical engineer of a large trucking company in Brooklyn. This company delivers a large amount of coal and sugar each year, and this gentleman told me that they had been trying to use motors, and while the truck itself had worked well, the motors that they had obtained had been so poor and unsatisfactory that they had decided to undertake the manufacture of motor cars themselves, and at that time they were turning one out every three weeks, and the result was that with those cars they had been able to deliver coal three times as rapidly as they could with horses and trucks. I also understood from him that when they had equipped their coal business with a sufficient number of trucks to handle the entire coal trade they proposed manufacturing trucks for the sugar trade, where they have loads of eight or ten tons to carry sometimes.

There was one thing that surprised me still more than this, and that was in answer to a question as to how those motors operated

in the winter. He said that last winter we had so much ice and snow after January that the streets paved with asphalt (even in the slippery weather) were much better adapted to the use of the motors than the streets paved with stone, and that when we did have in Brooklyn a sufficient number of asphalt paved streets to enable them to deliver their coal to all parts of the city on an asphalt pavement, then their motor service would be much more effective.

The sugar traffic which I allude to is so heavy that a few years ago we paved a street with the best granite blocks that come into the New York market, and in six months you could walk along that street and see a rut in the granite pavement. This was because there was a line of car tracks on the street, and the wheels of the wagons always went in nearly the same place. It was so serious that the sugar companies have had to send out men to separate this traffic and divide it up, but in a short time the ruts came in the same places again.

MR. OWEN: For fear of misunderstanding, and also somewhat in reply to my friend from Chicago, Mr. Grosser, I might say a word or two.

In the first place I wish to allude to one part of my paper, where I divide the classification of those franchises. Take the City of Chicago, which is a city of two million inhabitants, or take New York City, which is a city where this question can be agitated, because they can take care of the traffic within themselves.

In that portion of New Jersey where I stay we have a public service corporation which supplies about two-thirds of the community. Now, a municipal ownership in such a case as that would be an immense difficulty. Each municipality might decide to have its own service, owned by itself, and the result would be that you would have an incoherent mass without any development, and until a community is of sufficient size to have this development within itself I must differ with my friend Mr. Grosser.

Take, for instance, the street car line running from Detroit to Ann Arbor. A municipality could not operate a line like that.

MR. GROSSER: Well, the state could own and operate it.

MR. OWEN: The State of New Jersey would be constitutionally prohibited from operating such a line. There is no state debt, and never has been, and never will be.

I only offer this suggestion that Mr. Grosser's statement might be qualified to the extent that municipal ownership would be practicable for large municipalities, then I will agree with him entirely.

There is another point which seems to me to be important, and that is as to the financial capacity of the municipality to raise the money to build those plants. It is well known that New York has had to raise its taxation over thirty per cent, and get to its bonding limit in order to be able to construct the subway, and with all that the people are fairly well satisfied. This was an extraordinary way of extending public credit, but it is not popular, and I do not suppose Chicago would ever do such a thing.

MR. GROSSER: Will you agree with me that aside from financial and legal questions, municipal ownership or public ownership is the proper thing in theory and principle?

MR. OWEN: We say so in our paper.

MR. REIMER: My friend, Mr. Owen, has anticipated me a little, but let me put this before you.

Given a city of 275,000 inhabitants, out of which a trolley line runs for two miles, into another corporation with 25,000 inhabitants. It then runs for a mile and three-fifths into another corporation having about 28,000 people, and then about a mile into another with about 12,000 people. What would be the condition of a municipal owned trolley under those circumstances?

MR. HUTCHEON: The water works in our town were built by the city some twenty-five years ago, and have always been operated by the corporation. The gas and electric plants were taken over about a year ago by the city at a cost of $160,000, and have been operated for that year under the old management. After paying all expenses last year the committee were able to turn over something like $15,000 of profit to the city treasurer.

Under the old management the street railway was losing money —they lost a few thousand dollars every year (we have only five

miles of track). Well, it was taken over by the city at a cost of $80,000, nearly, about two years ago. The first year after it was taken over it lost something like two thousand dollars. The commissioners have extended the line, and acquired a park, and increased the traffic and the result is that this year the street railway system will pay expenses, and we expect that within a few years it will be a money maker. As I said, we have but five miles of track, in a city of 12,000 inhabitants.

MR. GROSSER: And after two years you find that the street railway system pays expenses?

MR. HUTCHEON: This year it will pay expenses.

MR. REIMER: What is the area of your town?

MR. HUTCHEON: It is a scattered place, about four square miles. We extend about a mile outside on one side of the city limits, and about half a mile on the other side.

MR. OWEN: Do you operate outside of the city limits?

MR. HUTCHEON: Yes, sir.

MR. OWEN: Under what authority?

MR. HUTCHEON: That I cannot tell you at the moment. The charter was acquired by the men who built the road, and the city in taking over the system bought the stock, and assumed the bonded debt. Of course I only cite this as a case where municipal ownership has been successful.

MR. PHILLIPS: Does Mr. Grosser think it possible or practicable to operate a trolley road system economically and honestly without civil service rules?

MR. GROSSER: At first glance I might be inclined to answer no. I think I pointed out in my remarks that even without civil service the disadvantages cannot possibly be as great as under corporate control, because to-day a corporation exercises a far greater influence in politics, in any large city, at least, than any city political machine can possibly exercise. We have seen this in almost all large cities. So that, while for efficient and economical administration we demand civil service, I do not believe that even

without it the disadvantages can be as great as under private ownership.

MR. PHILLIPS: I have seen it in the public press a short time ago that Mayor Dunne of Chicago had given expression to the declaration that it would be impossible, and that it was not his plan to extend the civil service rules to the conductors and trolley operators and motormen on the trolley cars—that they were not to be put on the qualified list.

MR. GROSSER: I think I can unqualifiedly state that Mayor Dunne never made such a declaration, and if any paper said so they stated something that was never said by Mayor Dunne.

I happen to be in a position to know exactly what Mayor Dunne says, or does not say, and I tell you that he never said that.

MR. PHILLIPS: If that was the case it would place a large number of employes in a class where they might be operated upon by politicians, and become a source of corruption, but, of course, Mr. Grosser says that the mayor does not hold that view at all, so there is no danger.

MR. GROSSER: Even the street cleaners in Chicago are under the civil service rules. The only exception in all the employes are the members of the legal department, the police judges and the clerks of the police courts, the heads of the departments and the bridge tenders.

In the "heads of the departments" must be understood the heads of the entire department, this does not include the city engineer. He is under civil service. The commissioner of public works is not. The city comptroller is not, but the city auditor is. The fire marshal is not, but the deputy fire marshal is, and every member of the fire department is. The chief of police is not, but his assistant is, and so are all the members of the force.

The effect is that actually only the members of the cabinet—the members of the law department, the police judges and clerks and the heads of the departments are not under civil service—to this list must be added (as a relic of the old squad system) the bridge tenders.

There being no further business before the meeting, the first session was thereafter adjourned.

SECOND SESSION.

The second session of the meeting was called to order by the President at 8:10 P. M., Tuesday, September 5th. He said:

The first order of business before us this evening is the paper on "Taxation and Assessment," which is the report of the committee on this subject. Mr. N. P. Lewis of New York is chairman of this committee. Mr. Lewis has not found it possible to be here, but I have his paper, and with the consent of the meeting will read it myself.

THE THEORY AND PRACTICE OF ASSESSMENTS FOR LOCAL IMPROVEMENTS.

BY NELSON P. LEWIS, CHIEF ENGINEER BOARD OF ESTIMATE AND APPORTIONMENT, NEW YORK CITY.

The subject of taxation and assessment has been so thoroughly covered by papers and discussions at previous meetings of the American Society of Municipal Improvements that it would seem as though little were left to be said. The chairman of the committee a year ago suggested that it might be advisable to combine this committee with that on city government and legislation, but the separate committee having been continued, I will present for your consideration some comments upon the theory and practice of assessments for local improvements. These comments will be confined almost exclusively to the practice in New York State, and particularly in New York City, which may be considered typical, notwithstanding that its enormous size and the varying conditions existing in its different boroughs naturally places New York City in a class by itself.

Improvements, the cost of which are usually assessed for benefit, are the opening of streets, the building of sewers, the grading and paving of streets, and the flagging of sidewalks. In some cities, street sprinkling is also assessed directly upon the abutting property, but this cannot be considered a local improvement. A recent statute affecting New York City provides that the planting of trees shall be treated as a local improvement and assessed upon the property benefited. The underlying principle governing assesments is the same in all cities in the United States, namely,

that where there is a special benefit there should be a special tax, and that the functions of the modern city are so varied and the sums required for general administration are so large, that it would be impossible to add to the tax levy the cost of making local improvements. While the laws in force in the different cities and states recognize this principle, the details vary greatly. The manner of authorizing assessable improvements in New York City is exceptionally simple. The city is divided into twenty-five local improvement districts, and the members of the board of aldermen resident in each of these districts constitute what is known as the district local board. The borough president is a member and the presiding officer of every local board in his borough. Petitions for assessable improvements are addressed to the borough president, who gives public notice of the fact and that a hearing will be given before the local board, a meeting of which is called to consider the petition. If the local board acts favorably, a certified copy of this resolution, approved by the borough president, is forwarded to the board of estimate and apportionment, and upon the approval of the latter board, the improvement is duly authorized and the borough president has power to contract for and carry out any physical improvement, while in the case of acquiring title to streets, the corporation counsel is directed to apply to the courts for the appointment of commissioners of condemnation, estimate and assessment. The board of estimate and apportionment can initiate proceedings for an improvement, but it has been held that the right to levy an assessment is doubtful, unless the proceeding shall have originated in a local board. Petitions for improvements need not be signed by any special number of property owners, nor is it essential that the petitioners shall be even abutting owners. It has also been held that the recommendation of a responsible head of a department or bureau that a certain improvement, such as the building of a sewer, or sewer basins, is necessary, is equivalent to a petition, and the board may act upon such recommendation and institute proceedings for the improvement.

The most complex problems which arise are in connection with the opening of streets, especially in New York City, and many instances can be given of abuses and absurdities in such proceedings. As street openings involve the taking of private property, they are necessarily court proceedings, and upon the application of the city's legal officer, three commissioners are appointed to determine the awards to be paid for property taken, to fix the district of assessment, and the amount to be paid by each parcel deemed to be benefited. These commissioners, when they have been appointed and have qualified, are practically a law unto themselves. They are the sole judges of the district over which the assessment is to be spread, and of the amount of damage and benefit. They are allowed a fee of $10 for each meeting of the commission, and there have been cases in which the same person has served at the same time on a number of commissions. Such appointments are profitable when one can report at two, three or more different meetings, be recorded as

present, find that nothing is being done, and go about his ordinary business. The owners of property to be taken are expected to prove their titles before this commission, and they can and usually do produce expert witnesses as to values. The city also employes its own experts to testify as to values. The awards paid frequently bear little relation to the assessed value or to actual values as indicated by the city's appraisers. In the case of a park recently acquired in the City of New York, the city's appraisers testified to a total value of the property taken of about $888,000. The commissioners awarded $1,999,000. These awards were subsequently reduced some $200,000, and the commissioners, on account of their valuable service in reducing these awards, applied for and received from the court an extra allowance of about $1,500 each. These figures are given from memory, but they are substantially correct. It may be said, however, that the property taken for this park is in a section where values are somewhat unstable and are naturally affected by the great bridges now being built across the East river. In the older portions of the city there is a more uniform relation between the assessed value of property taken for such purposes and the cost to the city by its acquisition. In a number of cases it was found that the ultimate cost to the city was from 2.1 to 2.5 times the asessed value of the property at the time that the condemnation proceedings were instituted. At that time real estate was assessed at about sixty per cent of its actual value; it is now assessed as nearly as possible at its full value, so that an increase of fifty per cent over the assessed value would be a fair figure for the cost of acquisition. Great abuses have sprung up where buildings are taken in street opening proceedings. There have been many cases where buildings of an inferior character have been deliberately placed within the limits of a street which it was known would soon be opened. "Expert" appraisers testified to the commission as to the great value of these buildings. After their purchase by the city they are sold at public auction and are usually bid in by the original owners for a nominal consideration, after which they are placed on rollers and moved back off the line of the street, little the worse for their journey. The more enterprising owners of such buildings move them, not to a site where they can remain permanently, but to a position within the lines of some intersecting street, where within a few years, or possibly months, they will be again condemned, again bought at their full value, as proven by "expert" appraisers, and again moved. There is one case in which the same frame building is said to have been bought three times for the opening of three different streets, bought in at a nominal sum three times by the same owner, and finally moved to a permanent site. It has been frequently urged that a street opening commission should make alternative awards for buildings taken, one award for demolition, which would be actual value, and another award for removal, which would represent the cost of such removal and the consequent deterioration in the value of the structure. Strange to say, these suggestions have never been acted upon.

The commissioners in street opening proceedings are also given specific authority to make allowance for intended regulating and grading of the street to be opened, where there are buildings which would be materially damaged by the physical change of the surface of the street on which they abut. This is another source of abuse, and it not infrequently happens that the damage allowed for is never imposed, but that before the improvement of the street the grade is changed to minimize or avoid entirely a damage which would follow the filling or the cutting down of the natural surface. It is entirely unnecessary that the street opening commissions should make such allowance, as the board of assesors for local improvements other than street openings are specifically given the power to make awards for such changes of grade and to include the amounts so awarded in the assessment for the improvement.

In view of the enormous expense of street openings under such a policy, it is not unnatural that the owners of property abutting on streets which have been used to any extent endeavor to avoid opening proceedings by claiming a dedication of their street as a common-law highway. This is one of the most difficult problems to deal with. Evidences of dedication are frequently very incomplete; affidavits showing public useage are readily secured, but as a rule they are entirely untrustworthy, and where sewers have been built or surface improvements made on streets claimed to have been dedicated, the collection of assessments has been resisted, and in several instances actions have been brought against the city for damage through trespass.

It was recently proposed to correct the abuses which have grown up in connection with street openings by the creation of a permanent commission of awards, this commission to consist of men carefully selected by the courts, in conjunction with one or more of the state and city officers, to hold office for long terms and to receive ample salaries. It was thought that the various condemnation proceedings begun by the city would keep a commission of a dozen or more men constantly employed, that there would be some uniformity of practice, and that the cost of these proceedings would be enormously reduced, but legislation providing for this change was not secured.

It has already been stated that upon the recommendation of a local board the board of estimate and apportionment has full power to authorize any assessable improvement. The board is also given the express power to determine what portion, if any, of the cost of such improvements shall be borne by the city at large. This you will say is a dangerous power to give to any body of men, but up to the present time it has been used wisely and conservatively. In the case of street openings, the board has determined that every street sixty feet or less in width is almost wholly for local purposes, and that the entire expense of acquiring it should be paid by assessment. Where streets are more than sixty feet in width, the board assumes for the city at large one-third the cost of acquiring that portion over sixty feet in width, so that for a street of eighty feet

the city would pay 8 1-3 per cent of the entire cost, while for a street 100 feet in width it would pay 13 1-3 per cent. Where an existing street is to be widened, the city at large will assume one-half the cost of acquiring so much of the property as is in excess of that needed for a street of sixty feet. In case a street of fifty feet is to be widened to eighty feet, the first ten feet to be acquired is at the expense of the property owners; of the remaining twenty feet to give the eighty-foot width the city will pay one-half, or one-third of the total cost of the proceeding. A rather curious limitation which has been placed upon the board of estimate and apportionment is that, having initiated an opening proceeding and determined what proportion of the cost shall be assessed, it cannot reconsider its own determination. Previous to the amendment of the Greater New York charter, which took effect on January 1, 1902, theboard of public improvements, which then performed the functions since transferred to the board of estimate and apportionment, had the power to amend its action in this respect, and it was the uniform practice to initiate proceedings with the express provision that the entire cost and expense should be borne by the property benefited. Before the confirmation of the awards and asessments, petitions would be submitted to this board for relief, and if the petitions were sufficiently strong and persistent, such relief would be given, its measure being determined by the force of the petition or protest. A few days before the board of public improvements went out of existence it reconsidered a large number of its previous determinations, and imposed upon the city at large from one-fourth to all of the expense of opening a number of streets. It was the danger of such action that doubtless prompted the provision in the amended charter, prohibiting the board of estimate and apportionment from reconsidering its determinations. An effort was made by the last named board to reconsider the action of the board of public improvements in the closing days of its life, but it was held by the courts that the limitations of the board as to its own action applied also to the board of public improvements. There were some few cases where relief could properly be given which were not acted upon by the board of public improvements, and the legislature of 1905 authorized the board of estimate and apportionment to reconsider the action of the board of public improvements in all cases where that board had determined that the entire expense should be assessed upon the property benefited, but it was careful not to give the right to reopen the cases where the old board had been over generous.

The city charter prohibits the levying of assessment for any single improvement which shall be more than one-half the "fair value" of the property assessed. This "fair value" is usually construed to mean its assessed value, and if the assessment for any parcel amounts to more than one-half its assessed value the city pays the difference. If the "fair," or actual value were used, there would be very few cases where the property could not stand the assessment, but the use of the assessed value frequently results in a great injustice, as where assessments are low,

the owners of the property will sometimes deliberately defer private improvements of any kind until all physical street improvements shall have been made and the city shall have come to their rescue by paying a part of their assessment, while those who have improved their property and added to taxable values are obliged to pay their full share. In some cities it has been the practice to assess not only original pavements, but all subsequent renewals of pavements. In the City of Brooklyn, before its consolidation with New York, it was the practice to assess one-half the cost of repaving, the city at large paying the other half. Since consolidation, however, the New York practice has prevailed, and it is now impossible to assess any of the cost of repaving unless a petition for such repaving shall have been presented, signed by the owners of a majority of the frontage on the street, which petition shall express their willingness to be assessed. It is unnecessary to say that while there is a chance of having their street repaved by the city at large, there is little probability of securing such a petition. It has usually been the practice in New York City to assess the cost of rebuilding or enlarging sewers, when such improvements became necessary, and in the borough of Manhattan the property values are so great that such assessments are not noticed and have been the cause of no complaint. In some of the other boroughs, however, extensive sewer construction has lately become necessary, as well as the building of large relief sewers to avoid flooding. This flooding has become more frequent and more disastrous as smooth pavements have been laid, resulting in a more rapid run-off of surface water, and the city has lately committed itself to expenditures of millions of dollars for the enlargement of sewers and the building of relief sewers in districts where the property is amply able to pay the cost of such improvements.

There is a certain class of street improvements which, while they will have a decidedly beneficial effect upon property in the immediate neighborhood, are of such great importance to the entire municipality that they frequently are, and properly so, carried out at the expense of the city at large. I refer to the laying out and improvement of new streets designed to give access to important structures, such as great bridges, or to furnish more ready connections between commercial, manufacturing or transportation centers. Instances of this kind are the approaches to the great bridges recently built or under construction across the East river, in New York City, such new streets being necessary for collection and distribution of the immense vehicular and surface railroad traffic which these bridges will accomodate. The laying out of such streets and their location must be determined by some central authority, and cannot be left to the initiative of individauls whose property would be affected, or even of local boards. It is therefore difficult to secure petitions and resolutions of local boards, in the absence of which, as already stated, assessments for benefit cannot be levied. That there is great benefit to the property which will front on these new thoroughfares cannot be questioned, and in equity the property so benefited should bear

at least a portion of the expense. If, then, the city at large finds it necessary to assume the entire burden of laying out, opening and improving such thoroughfares, the city at large should reap the benefit. This could be readily done were the city able to condemn not only the area needed for the proposed new street, but the abutting and contiguous property, the value of which will be greatly enhanced by the improvement. Our present laws do not permit, and it is doubtful if public sentiment at the present time would approve of the city's embarking in a real estate enterprise. This practice, however, is the rule, rather than the exception, in European cities.

In the City of London a great improvement of this kind is now under way which involves the widening of the Strand, between Wellington street and the Church of St. Clement Danes, a distance of about 1,250 feet, the laying out of a new crescent-shaped street 100 feet in width connecting with the Strand at these two points, and of a new avenue 110 feet wide from the middle of this crescent to High Holborn, at Southampton road. The length of the crescent is about 1,400 feet, and that of the new avenue connecting it with High Holborn is about 1,600 feet. The city is said to have already acquired the greater part of the contiguous property, which it purposes to hold, and it is expected that the sale of long rentals for its occupation will make the investment a very profitable one, although the cost is estimated at about $25,000,000. A further advantage is that the city can control absolutely the architectural development of the street and the purposes for which the property is to be used, and the result in this case will doubtless be the creation of one of the finest thoroughfares in the world. Improvements of this class, which, though most desirable, are often considered prohibitive in cost, might thus be made profitable ventures, while the theory of a special tax for a special benefit would not be violated. The city in this case pays a special tax; would it not be fair that the city should also reap the special benefit, rather than create at public expense a new thoroughfare which would add enormously to the value of the property of those which are fortunate enough to front thereon? I cannot but believe that this practice will ultimately be adopted in American cities.

It has often been urged that there should be uniformity of practice in the different states and cities in the levying of assessments for local improvements. Such uniformity might be a fortunate thing for the students of municipal government, but the conditions in the different states, the variation of the constitutional limit of the bonded indebtedness of cities, etc., varies so greatly that uniformity of practice seems to be impracticable. It might be possible to secure uniformity in the cities of the same class in each state, or possibly for all the cities of one state, but further than this it will doubtless be impossible to go. Conditions in the different boroughs of New York City vary so greatly that it might be wise to adopt for those of a suburban character a different method from that followed in the older sections where the property values are very much greater.

THE PRESIDENT: The next item on our program is the report of the Committee on City Government and Legislation. Mr. William S. Crandall of New York City is chairman of this committee, and it is now in order for us to hear the report he has to make.

MR. CRANDALL: As is sometimes the case, there is no report to be made this year on the subject allotted to me, City Government and Legislation; there are rather two papers, the first by Mr. Thomas J. Neville, Commissioner of Public Works, Rochester, N. Y., who is present and will read his paper covering the White Charter, covering, I think, five cities in the State of New York. I am pleased to introduce Mr. Neville to you.

MR. NEVILLE: Mr. President and Gentlemen: This topic is not one that I am particularly qualified to deal with or discuss, as it deals largely with the charter which we have in four cities in the State of New York, namely, Rochester, Syracuse, Albany and Troy. My paper simply contains a running review of the charter and the causes which led to its introduction. It also touches somewhat upon the law under which those cities are now exercising municipal authority.

Without further introduction I will proceed with the reading of the paper.

LEGISLATIVE FUNCTIONS UNDER THE WHITE CHARTER AND THE PRACTICAL EFFECTS OF THE LATTER UPON MUNICIPAL GOVERNMENT.

BY THOMAS NEVILLE, COMMISSIONER OF PUBLIC WORKS, ROCHESTER, N. Y.

"Legislative functions under the White Charter and the practical effects of the latter upon municipal government," is the subject submitted to me for discussion before this Convention.

I may consider, firstly, the legislative functions of the White Charter, by reciting briefly the causes that gave rise to the charter and its central idea for the government of certain cities.

By the Constitution of the State of New York, the cities are divided into three classes, acording to population. Rochester, Syracuse, Albany and Troy are in the second class and are governed by what is known as the "White" Charter, taking its name from Senator Horace White of Syracuse, who introduced the act in 1898, which went into effect on the first of January, 1900.

It was generally believed that this charter repealed all acts or laws passed for the government of these cities, but the fact is that it only repealed those laws inconsistent with those embraced in the bill and left all preceding laws that did not conflict with the provisions of the White Charter in full force and effect. So it may be understood, that the cities named are now governed by what is known as the White Charter *and all the old charter provisions that were not repealed.*

I may state that Rochester has had the experience of many other cities in the matter of its charter construction. From the simple village creation, additions were made from year to year, until the structure became a composite of additions, amendments and alterations, and was referred to by press and people as a mass of contradictions and inconsistencies; and tinkering the charter to suit some individual or other local purpose was made the duty of the legislature from year to year.

In 1880 the legislature passed an act authorizing the amending and consolidating of the several acts relating to the charter of the City of Rochester. Special acts have been passed for various purposes, such as parks, trunk sewer systems, police and fire departments, protection of water supply and other special matters of this character. In addition to the White Charter and the remnants of the old charter, general laws have been passed which effect the government of the city and which have to be observed and enforced.

The constitutional convention of 1894 classified the cities of the state, and in 1895 the legislature passed an act authorizing the governor to appoint a commission to prepare and report a law for the government of cities of the second class. Under this act Hon. James G. Cutler, the present mayor of the City of Rochester, was one of the appointees. Associated with him were Alden Chester of Albany, Michael E. Driscoll of Syracuse, David M. Green, Troy; ex-chief judge of the Court of Appeals, Robert Earl of Herkimer, as commissioner at large. Mr. Chester having been subsequently elected justice of the Supreme Court, his place was filled by Arthur L. Andrews of Albany. This commission reported to the legislature in 1896. Upon the report of this commission, the legislature passed an act, in 1898, upon which was based the charter to which Senator White of Syracuse gave his name.

The formative idea of the White Charter was to centralize authority in the mayor, giving him absolute control over the executive branch of the municipal departments with power to hold them to responsibility for the faithful performance of their duties and power to remove, at pleasure, any appointee who failed to perform his duties to the satisfaction of the mayor and according to his judgment and direction.

It took away from the common council, or board of aldermen, all powers except those of a legislative character, and made the mayor controlling power in the executive branch of municipal government.

It created two boards, one designated as the board of contract and supply and the other as the board of estimate and apportionment. The

former board is made up of the mayor, the corporation counsel, commissioner of public works, city engineer and the city comptroller. The board of estimate and apportionment is composed of the mayor, the president of the common council, the city comptroller, the corporation counsel and the city engineer.

The functions of the board of contract and supply are the awarding of all contracts for public improvements, public buildings, etc. The board of estimate and apportionment, as its title implies, makes up all estimates for the fiscal year, for the care and maintenance of the several branches of the city government; and these proportions, as determined by this board, are subject to the approval of the common council, and the amounts cannot be increased, but may be decreased by that body.

A detailed statement of the duties of the heads of the several departments I deem unnecessary in this paper and therefore pass that by, but I will be pleased to answer any inquiries by the members of this Convention which may be made concerning the duties of such officers.

The second clause of the subject matter of this paper, namely, "The practical effects of the latter upon municipal government," offers opportunity for the expression of differences of opinion as to what the practical effects have been in each of the cities where it is in force.

The general opinion of officials having to do with the practical administration of city government is, I believe, that a uniform charter for any group of cities is almost impracticable, excepting in what are the fundamental principles of government in every state where law and order is established.

When it comes to details of municipal administration, it is often found that theory does not always harmonize with practice and many of the provisions of laws designed to attain a better system of government are found to be difficult of enforcement and are often slighted, ignored or violated. And these evasions of the law are often justified, on the ground of expediency, or as the only manner of administering city affairs through business-like methods. So the city official has often the difficult problem of determining, in order to do his work expeditiously and effectually, to follow the strict construction of the statute, or by placing a reasonable interpretation upon its meaning, incur the consequent danger of having his acts brought under the suspicion of corrupt intention.

The administrative functions of all cities are in the main alike, but what may be an economical mode of procedure in one city may be in another expensive or impracticable, because methods and details of government vary acording to local conditions. In a word, you cannot clothe several towns or cities in the same coat, for while it may fit in some respects, the garment will be a misfit in others. It may be too long or too short, too close fitting or too loose.

There is no doubt that the gentleman who laid the foundation for the White Charter gleaned from the study of the code of laws existing throughout the country and the results of the operation of such laws, the best

methods of municipal government obtainable and condensed and formulated them into the uniform charter now in force in the second class cities in New York State. They, no doubt, did not believe that it was a perfect code of government, but intended to do away with the incoherent and disjointed procedures of the past, which mixed legislative, executive and judicial power in such a way as to divide responsibility, rendering it almost impossible to fix liability for irregularities or corrupt action. In that respect the White Charter has been a success and its operation effectual.

The twenty aldermen composing the legislative branch of the city government and representing the several wards or districts of the City of Rochester are in close touch with their constituents and know the needs and wants of their people and are enabled to intelligently legislate in their interests, while the executive branch of the city government, carrying out the will of the citizens as expresed through their laws and ordinances, and being responsible for the care and maintenance of the city's property and the expenditure of the moneys raised by taxation, is centered in the head of the government, the mayor, who is directly responsible to the people for the conduct of the prudential affairs of the city and for the proper management of the several departments in the administration of the city government.

Touching upon the general statement that the instrument in question is not perfect, I took occasion to secure expressions of opinion from the cities of Syracuse, Albany and Troy, from which I abstract such matter as will bear upon this subject.

An official of Syracuse makes the following reply: "It has always seemed to me that the idea of this charter was to concentrate, as far as possible, the responsibility and power in the mayor. The difficulty with the charter, in my judgment, has been in the application of this idea to the divergent needs of the different municipalities. Our city is, of course, also governed by its old charter, which is known as the revised charter of the city, and since the White Charter went into effect there have been a great many amendments made to our revised charter, and especially during the last session of the legislature, so that it would be very difficult to say at the present time, without much study and investigation, to just what extent our city is now governed by the provisions of the White Charter."

Albany says: "We did not introduce any amendments last winter. The charter operates admirably in our city and without friction."

Troy replies: "I am pleased to inform you that no amendments have been made in our instance. We have, however, in public work projects inaugurated under special laws in force at the time of the uniform charter's first application, found it necessary last year and this year to seek and secure special legislation upon those subjects to provide the means of carrying out the projects. We find here that the new charter works well, allowing for the infirmities of the scheme which can be remedied from time to time as they present the necessity for such remedy."

In the City of Rochester the following amendments have been made:

In the year 1900 three acts were passed amending the charter. Eight different sections were amended.

In 1901, five amendments.

In 1902, eight amendments.

In 1903, eleven amendments.

In 1904, seven amendments.

In 1905 there were six amendments, and twenty-seven sections of the old charter of the city were amended.

In the year 1905 most of the four cities contained in the second class obtained the passage of special acts relating to each city, thus removing them, so far as the matters contained in said acts are concerned, from under the provisions of the White Charter.

Despite all the amendments to the White Charter and to the charter to each of the cities of the second class, the form of government prescribed by the provisions of the White Charter still remains in force, amendments and alterations relating only to details and matters of procedure.

MR. NEVILLE: The summary of the matter is this: I do not think it is within the power of any city to lay down laws that will answer for other cities. My personal belief is that there is nothing that can be done to govern a city except a charter that will provide for the conditions and requirements of that city.

Like a general law, a charter may be framed that will apply to Montreal, Toronto, New York and Chicago, but when it comes down to a matter of strict administration I do not believe that there is any set of men who can frame a charter which will answer all the purposes of each and every one of the cities, especially if those men are not in touch with all the conditions and requirements of each of the cities. We have in the City of Rochester a great many amendments which have been introduced, and which are now in force since this White Charter was adopted.

THE PRESIDENT: This paper is now open for discussion, and, as I think, Mr. Neville stated he would be glad to answer any questions in regard to the details of the charter itself, or its workings. Are there any remarks on this paper?

MR. BROWN: I would like to emphasize the statement that a single charter can hardly be formed which will successfully govern a number of cities, still I think it might be modified a little, and I say this from the experience we have had in our state. The charter

described by Mr. Neville was evidently founded on the same idea as the Indianapolis charter, which has been in successful operation thirteen years. Of course, it has had some amendments, but they have been only matters of detail.

From time to time during the thirteen years some of the smaller cities in the state have adopted charters based upon the Indianapolis charter, and modified to suit their particular conditions. Those cities were classified by population, and when a city passed from one class to another at the census it had to change its form of government in order to suit the constitutional provisions. The result of this was not altogether satisfactory, and last year a codification commission which had been appointed by the legislature prepared a charter which would apply to all the cities of the state, the idea being that the different cities could modify it to suit the conditions of their class. It was divided into five classes. The first class was for cities of over 100,000 inhabitants, and the fifth class was for cities under 5,000. You will see from this that they tried to cover a great number of classes of cities in one charter.

The practical result of the charter supplied is that we have only the one charter—only one standard to judge by—and the Indianapolis charter, if left as it was, is practically as satisfactory as it ever was.

The charters of the cities of the second class were changed so slightly under the new charter that they are also satisfactory. The third class cities are somewhat more materially changed, but when we get down to the fourth class there is some trouble, and when we go as far as the fifth class no one knows what acts govern them, and it is extremely difficult to proceed with anything that the city is trying to do.

In other words, the state tried to do too big a job all at once. So far as the larger cities are concerned, the results are entirely satisfactory, but the smaller cities (as Mr. Neville has suggested) cannot be governed by the same form of government.

THE PRESIDENT: Are there any other remarks on this subject?

MR. CRANDALL: Acting on the suggestion of several people interested in the general discussion of this question, I secured a paper

from Dr. Milo R. Maltbie, who is the secretary of the Municipal Art Commission of New York City, and who is very familiar with the charter governing Greater New York. This paper is entitled "The Legislative Functions of Greater New York." Inasmuch as Mr. Maltbie is not with us, I would ask that the paper be read simply by title, and that it be printed in the proceedings and come up for consideration at a later date.

Mr. Maltbie's paper is as follows:

THE LEGISLATIVE FUNCTIONS OF GREATER NEW YORK.

BY MILO R. MALTBIE.

(Secretary Municipal Art Commission of New York City, and Consulting Editor of the *Municipal News,* 309 Broadway, New York.)

With very few exceptions every modern city has a legislative body chosen to represent the people and to determine the general character and policy of its municipal administration, but the functions of these legislative bodies vary greatly, and the discussion of their character in New York City resembles very closely a treatise upon snakes in Ireland.

In the early part of the last century the New York board of aldermen had large powers, both of legislation and of administration. But rightly or wrongly, it came to be blamed for nearly all of our municipal shortcomings, and year by year it was short of its prerogatives. Certain ones were transferred to the mayor, others to the administrative departments, others to the newly created board of estimate and apportionment, and still others, constituting by far the larger portion, were taken over by the state legislature itself. The most recent move in this direction was the law passed at Albany last winter transferring the power to grant franchises from the board of aldermen to the board of estimate.

The city charter contains many sections enumerating the powers of the board of aldermen, and one might infer therefrom that it is an important body. It may make, amend and repeal ordinances regarding a long list of subjects. It may order the acquisition of water works, markets, parks, bridges, tunnels, wharves, public buildings, schools, etc. It may regulate a long list of trades. It may fix the salaries of city officers and perform many other functions which at first glance appear to be very important.

The restrictions and limitations upon these powers are so great, however, that little discretion is left. In the first place the board of aldermen has nothing whatever to do with the preparation of the budget. This function belongs exclusively to the board of estimate and apportionment, which considers the wants and needs of the various departments and determines the amounts to be appropriated for the coming year. The

budget is then forwarded to the board of aldermen, which is allowed only twenty days to consider it and may only decrease certain items. Even then its action is reviewable by the mayor, and his veto may be overridden only by a three-fourths vote. Further, all bond issues must originate in the board of estimate, and if a majority of all members of the board of aldermen shall not vote againt a proposal issue within six weeks, it shall take effect without their approval. Even changes in salaries must first be passed by the board of estimate.

The most important restriction grows out of the requirement that all acts of the board of aldermen—and of every city functionary—must be in conformity with state law. When it is remembered that the state legislature regulates in greatest detail every phase of municipal administration, fixing not only the general lines within which the city may act, but the minutiae of municipal administration, it becomes apparent that the board of aldermen has little to do. An examination of its minutes show that most of its time is devoted to the passage of resolutions which have no binding effect, a few ordinances dealing with matters not covered by state law, the approval of increases in salaries, bond issues and appropriations, all of which originate in the board of estimate, and the appointment of commissioners of deeds.

The board of estimate and apportionment is a far more important and powerful body. Through its control over appropriations and bond issues, it determines the general policy of the city government so far as it is determined by any local authority. If it does not approve a specific plan, it may withhold the funds necessary to give it effect. If it believes that the city needs public baths, additional parks, play grounds for the children, a municipal lighting plant, free ferries or what not, it has only to authorize the appropriation and the thing is done. And now it possesses the right of granting franchises, whether for street railways, subways, telephones, water, gas, electricity, steam heating or pneumatic service. It is, therefore, the most important body in the municipal government of New York, and has far more legislative authority than the so-called legislative body of the city—the board of aldermen.

The constitution of the board of estimate is unique. It is composed of eight persons, the mayor, the comptroller, president of the board of aldermen and the presidents of the Boroughs of Manhattan, Brooklyn, Queens, Richmond and the Bronx. The first three are elected by the city at large, the others by the different boroughs. In order to give those elected by the whole city a controlling influence, the charter provides that the mayor, the comptroller, the president of the board of aldermen shall each have three votes. The presidents of the Borough of Manhattan and the Borough of Brooklyn, because of the large population of each of these boroughs, are given two votes each, and the others one each, making a total of sixteen votes. As nine votes are a majority, it is evident that the three officials elected at large can out vote the other five members.

The chief peculiarity, however, is that the members of of this board are not elected to their positions as such, but rather as heads of depart-

ments. The mayor is the chief administrator of the city; the comptroller is the financial head of the city; the president of the board of aldermen presides over that body; and the borough presidents are chiefly concerned with local improvements. However unusual may be its character and organization, the board of estimate thus far has given very satisfactory results, and its decisions generally commend themselves to public approval—certainly to a far greater extent than those of the board of aldermen.

The chief legislative body for the City of New York is the State Legislature, a *state* and not a *local* authority. If anything of importance is planned, power must be obtained from Albany, and not infrequently party politics is a far more important factor in legislative councils than the welfare or preferences of the city. Every session is clogged with measures affecting New York City, in the main passed and lobbied for by persons who have peculiar reasons for wishing them enacted. The city has found it necessary to keep a special representative at Albany, a skilled lawyer and ex-senator, to protect the city's interests. Notwithstanding, legislative interference has gone so far that two-thirds of the expenditures in the city's budget are mandatory, that is the city authorities have no choice but to include these amounts; they are required to be paid by state law. Of the remaining one-third nearly one-half is practically mandatory, so that only about one-sixth of the city's budget is entirely in the hands of the local authorities. Evidently home rule is largely a myth.

The results of such conditions have been disastrous both for city and state and will continue to be so until some system is established which creates local responsibility. How can one expect that local matters will receive due consideration from those who are in no way responsible or amenable to the locality concerned? The remedy, therefore, is home rule, and preferably constitutional home rule upon the Missouri or California plan, where each city has the right to make its own charter. This implies some sort of local legislative body, which shall have full and complete authority to determine the general policy of the city, to make appropriations, to issue ordinances, or order public works,; in a word, to deal fully with every local matter or need which may arise. The exact nature of this body will largely depend upon local conditions. Chicago believes it wise to build up its council—a body similar in constitution to the New York board of aldermen. New York will probably find it preferable to develop its board of estimate into a truly representative body by certain modifications and to abolish the board of aldermen. The board of estimate at present is illogical and out of harmony with the inherited theories of government, but its record is good and if made more representative would doubtless become an ideal legislative body.

THE PRESIDENT: We will now pass on to the next order of business, which is the report of the Committee on Park Development and Maintenance. Mr. G. A. Parker is the chairman of that com-

mittee, but he has not found it possible to be with us, therefore, if it is your wish we will simply read the report by title, and have it inserted in the proceedings. Mr. Parker's reason for not being here is that he has been in poor health lately.

WHAT MAY BE THE TREND OF PARK DEVELOPMENT.

BY G. A. PARKER, SUPERINTENDENT OF PARKS, HARTFORD, CONN.

In order to more clearly see the tendency of the park development of today, it is well to recall the salient points of park growth in the past. The first historical record shows the beginning of what might be called the improvement of grounds surrounding homes within cities to have been the Egyptian patio, which consisted primarily of a paved court nearly surrounded by a building or buildings with loam spaces in the paving for palms or other planting; but the paving predominated. This also was the development of grounds of the other historical nations which were located in the great valley through which flowed the Euphrates and Tigris rivers north of the Persian gulf. To make extensive variations in the topography of grounds for gardneresque effects apparently began in Babylon, culminating in the famous hanging gardens of that city.

The Grecians with their love of the beautiful and keen perception of the ratio and relationship of lands, surfaces and forms in pictorial composition, expended the patio of ancient Egypt into geometrical gardens, structurally correct as to proportions, but simple in their embellishment, although well furnished with garden furniture and ornaments. The Romans adopted largely the Grecian garden, although not so good as to composition, it was highly embellished. From the old Roman garden has come the medevial and modern Italian gardens. Now Italian gardening is not geometrical gardening as some seem to suppose, although straight lines and grades, parterres, steps and balustrades prevail. It was in reality an outdoor room of their country villa made for the comfort and convenience of the people and not primarily for display as is so often the case with our so-called Italian garden. Their parterres were several times larger than the Egyptian patios and different from them in their grass and planting predominated, although there was an abundance of walks and gravelled or flagged surfaces. The Italian loved his parterres. Usually he had two or more of them at different levels connected by steps and protected by balustrades. He had his hedge under the shade of which he walked, with outlooks over the valleys. He had cozy nooks with seats; he embellished his grounds with statuary, and introduced fountains and cascades, but not still waters.

The Moor brought to the Spanish Peninsula the gardening of the Far East which had an influence in modifying the Italian gardens as they spread over France and central Europe, and what is now known as the French, German and Dutch gardening, is largely Italian and Moorish

gardens modified by the needs of the people and environments. This style of gardening to have reached its full development of principles, during the age of Louis XIV, when it took on tremendous proportions under the genius and skill of the celebrated landscape gardener, Le Notre.

Continental gardening gained a strong foothold in England some three centuries ago, but being somewhat unsuitable for the climatic conditions it had to contend with, and also not being entirely in keeping with the character of the people, it took on an unsatisfactory form, that is, unsatisfactory for the Englishmen, and became the subject of satire by Lord Bacon and others, until finally Wadsworth, Price, Brown and Ripton broke away from it something over a century ago and laid the foundation of what is now known as naturalistic landscape gardening. Parmateer was the first to practice naturalistic gardening in the United States. Then Downing came with his works and books and laid a solid foundation for it on which the genius of the elder Olmsted is built as the master workmen, the great park systems of the cities, and this brings it down to the present time.

All development of grounds began as a private enterprise. Ownership of land rested in the crown and nobility during most of the centuries that gardening has existed and the right of eminent domain still asserts that the ultimate ownership of land rests in the government. Ownership of land by the people and for park purposes did not become common until after the organization of our government. Somewhere I remember reading of an old Roman Emperor who gave his private gardens and grounds to the people of Rome to be forever used by them for their pleasure. This, as far as I know, was the first time in the world that the people living in a city owned a park. There are many instances where the people have used land in common for their pleasure, but the ownership was elsewhere.

This using land in common was the beginning of the village common and broad streets so frequent in England and which was transplanted to America with the first settlers, and that with the love of the Spaniard for his plaza led to the establishment of public squares, wide streets and pleasure grounds in the old settlements of this country and were quite common before the Revolutionary War. But after that war up to 1850, villages and cities were generally laid out without public grounds. Especially was this true of manufacturing and commercial cities.

In 1847 with the publishing of articles by A. J. Downing began what has since developed into the public park movement. In 1854 there was bought in this country the first acre of land by the public with the public money for purely and simply park purposes by the cities of Worcester, Hartford and New York. The movement extended to several cities, but was checked, in fact almost stopped by the Civil War until 1870, when it began again with a constantly increasing force and it is still growing, and probably this year more money has been spent for park purposes and more acres have been added for park uses than any year previously and next year promises to exceed this.

Now let us see what changes have come since Downing wrote of his conception of what park work means for our cities. First, there came the public square in the midst of the city. Then there was the large scenic park a little outside, followed by the desire to have a series of parks and squares connected by boulevards and parkways and which would serve all sections of the city, making it a well-balanced system both as to territory and population.

The first basic idea in most of this work was to produce public grounds that were beautiful to look upon and where people might find rest for their mind and body and invigoration for their spirit, where they could take the sedate and dignified exercise by walking or riding; but none or little provisions were made for active, vigorous or intense play. But that was to follow. In 1892 the first out-door gymnasium was established at Charlesbank in Boston. In 1896 the first sand boxes were put into public grounds for small children to play in. In 1899 the report of the commissioners for small parks in New York was made. Two years ago Chicago began to realize her project for neighborhood parks and field houses which made the parks useful in rainy weather as well as pleasant, in cold weather as well as warm, and in the evening as well as in the daytime, and they are the modern expression of the pressing need of our present cities. In 1898 the playground movement began to gather strength and during the last year or two has come into full swing. It has spread over this country and throughout Europe more rapidly, more completely than any other movement ever started relating to public grounds. It has come to stay. It differs essentially from all previous movements in that the need of the people predominate and the ornamentation ground is secondary, instead of the reverse which was true formerly.

The question of the systematic and scientific play of children is quite new in its present phase, yet the result so far obtained exceeds the expectation of those who expected the most from it. So much so, that it seems to be another revelation of our Creator to enable us to meet the conditions under which such a large proportion of the people must live in our modern urban life.

A century ago when hardly three per cent of the civilized world lived in cities, it did not matter as much in the world economies if children could not be raised in the city, for the country could be drawn upon to supply the need of human life in cities. But now when it seems probable that at least one-half of the children will be born in the city and must grow up there, it is of the utmost importance that means are provided that they may grow into strong, healthy men and women and free from immoral taints. And as parasitic insects and fungi attack plants which are not vigorous or on the wane, much more easily and severely than healthy plants, so one of the best shields against iniquity for a child is a healthy body; therefore playgrounds not only make for the physical health, but also for the moral health of a child, and one thing that a city cannot afford to get along without are playgrounds for children.

More than that, ample playgrounds will some time be provided for all men and women who will play, of whatever age, for our modern factory and mercantile life which concentrates a person's energies into one thing, making them specialists in the work of their hands and of their head, to the weakening and atrophying of the functions and organs not used, and play is one of the remedies that will help this. If men will play, they are helping towards removing the evils of modern conditions and there should be no limit to the age period. One of the pleasantest sights I ever saw was in that section of Druid Hill park in Baltimore, which by custom has been set aside for old men, seventy or eighty years old, who every pleasant day have their games and contests at croquet. Day after day these stately old gentlemen come to the park to play this game and to be together. They presented as fine a showing of happy old age as I have ever seen, and nowhere else have I ever seen old men at play, and I was told this had become a habit with men of that age in Baltimore.

This, then, is my answer to the question which heads this paper—that the tendency of the park movement is towards public parks fitted for all the uses which people may have of them, that that fact is to predominate and only after that need is supplied, are the grounds to be ornamented. That structurally they must first be made useful and then beautiful, but fortunately—no, it is not by chance, but by a law of the creation—beauty and use go hand in hand, and what is most useful may also become the most beautiful.

THE PRESIDENT: We will now hear a lecture by Mr. F. G. Todd, landscape artist, of Montreal, on the subject of "Character in Park Design." I have much pleasure in presenting Mr. Todd to you.

Mr. Todd's lecture was most interesting, and very much appreciated by the members present. He threw on the screen several excellent slides of the various parks in Canada and the United States, giving a running description of them and their many points of attraction. Among the slides exhibited by Mr. Todd were scenes from Franklin park, Boston; Municipal park, Galt, Ontario; Strathcona park, Ottawa; Victoria park, Strathford, Ontario; City park, Winnipeg; Fresh Pond park, Cambridge, Mass., and many others.

At the conclusion of the lecture Mr. Todd was heartily thanked by the Society for his most entertaining lecture.

At the conclusion of Mr. Todd's lecture Mr. Harry Bragg, editor of the *Canadian Municipal Journal,* Montreal, was intro-

duced to the meeting, and gave a lantern lecture on "Canadian Cities, Their Location, Position and Attractions." Mr. Bragg uses about one hundred stereopticon slides.

The lecturer explained that the views had been specially prepared, and took the audience from Halifax, N. S., across the continent to Vancouver, B. C., explaining the special features of each city in a rapid manner. He caused some amusement by promising a picture of a "Free Public Art Gallery" and then throwing on the screen a long line of advertising hoardings.

Of the City of Montreal, views of both summer and winter scenes were shown, the speaker urging the visitors to come back again in the winter to see what enjoyment there was then in the dry, cold weather.

He surprised a good many of his hearers by pointing out that in the Canadian Pacific railway Canada possesses the only transcontinental railway in the world, and that it was possible for a traveler to come from England in a C. P. R. steamer, get into the same company's sleeper at St. John, N. B., travel across the American continent to Vancouver, B. C., and then take another C. P. R. steamer across the Pacific to Asia.

Mr. Bragg was heartily thanked by the President on behalf of the members of the Society for his lecture, the President remarking that rarely had he acquired so much information in such a pleasant manner, and that it was a revelation to him and no doubt to many of the members present to learn what beautiful cities the Dominion possessed.

THE PRESIDENT: We will now have to deal with the report of the Finance Committee. If the chairman is prepared to report, we shall be glad to hear him.

Mr. Chausse, chairman of the Finance Committee, presented the following report of the committee:

REPORT OF THE FINANCE COMMITTEE.

Your Finance Committee herewith reports that it has examined the accounts of the Treasurer and found them correct.

The balance on hand on September 2, 1905, was $432.08, and the receipts for the year $650.75, making a total of $1,082.83.

The total disbursements have been $360.91, leaving a balance on hand of $721.92, which must be considered very satisfactory.

The committee has also examined the accounts of the Secretary, and find that he has received $650.75 and has paid the same to the Treasurer.

All of which is respectfully submitted.

ALCIDE CHAUSSE,
Chairman.
AUGUSTUS F. EGGERS,
ERNEST S. BARROW.

THE PRESIDENT: Gentlemen, you have heard the report of the Finance Committee, what is your pleasure with regard to it?

MR. TILLSON: I would move, Mr. President, that it be accepted, and printed in the proceedings.

Which, being duly seconded, was carried.

THE PRESIDENT: We have another paper on "Municipal Parks," by Mr. John N. McClintock. I think that it would be as well to hear Mr. McClintock at this time; is that the wish of the meeting?

It being the pleasure of the members that Mr. McClintock should be heard at this time, he presented the following paper:

MUNICIPAL PARKS.

BY JOHN N. M'CLINTOCK, BOSTON, MASS.

I drove as a lad with a party from the ancient walled City of Chester to the park surrounding Eaton Hall, the home of the Marquise of Westminster, where I received my first lesson in park construction.

One of the most beautiful parks in the world I saw years ago in the Indian Territory; we were hours in passing through it on an express train, and it reached as far as the eye could see on either side of the railway, which was the only evidence of man's occupation of the land. The country was undulating—plains and low hills covered with green grass, with here and there a grove of trees.

We are not now considering private grounds, however beautiful and attractive their lay-out may be, like Eaton Hall park near Chester, nor the broad parks of Nature's own unaided creation, whether among the mountains, by the seashore, or on the western plains; our interest as a Society is in the municipal park, which the Century dictionary defines as

"A piece of ground, usually of considerable extent, set apart and

maintained for public use, and laid out in such a way as to afford pleasure to the eye as well as opportunity for open air recreation."

A municipal park should be laid out in such a way as to afford pleasure to the eye and to every other sense. For example, New York Central park is pleasing to the eye because of the grass and the trees, the shrubs and the flowers, the graceful curves and easy grades of walk and path and road, the undulating surface of lawn, ledge and cliff, water in basin and reservoir, bridges, monuments, and other structures.

The paths are hard and firm and shaded, and feel right to the feet; the turf tempts one to recline; the seats are smooth and inviting.

The noises of the city are distant, and one hears only the prattle of children and the wild music of birds.

The water flowing in the fountains appeals to the most refined taste, and satisfies the thirst of man.

The smells of the streets of the great city are kept outside the park, and within only the odor of flowers greets the nose.

Central park is pleasing to the eye and to every other sense because it is beautiful, sweet, clean, wholesome and restful. It was laid out by artists, and nature and art combine to give the pleasing result. It is a harmonious whole; to improve it in any respect is a matter of detail for the specialist.

One of the most pleasing features of a park landscape is a body of water; it may be the ocean, a harbor, a river, a brook, a lake, or a pond.

The water in and about a city should be treated as a part of the park system of the city; it should be kept clean, sweet, wholesome and pleasing to the eye.

The water surrounding or bordering or dividing a city is approached by way of the shore, which also should be kept clean, sweet, wholesome and pleasing to the eye, and a part of the park system of the city.

The water may form a harbor that shelters the ships which carry our produce to every port of the world and which bring back the wealth of the Indies to our shores, but the ships riding at anchor or moored to the wharves do not detract from the natural park-like character of the water of the harbor; they are like swans in the park basins.

The ocean steamer, the river or sound steamboat, the battleship and cruiser, yacht, sailboat, tug and everything that floats upon the water is more or less pleasing to the eye; they do not conflict with the park idea, but form an attractive feature.

The shore of the harbor is required for commerce, but there need be nothing repulsive about commerce. The cargoes of the great ships coming or going are food stuffs, raw material for clothing or building, or the manufactured articles, all of which are largely stored in warehouses.

The marginal street of a city situate on river or harbor may be kept as sweet and clean as the streets in the retail-shopping or residential districts, and at night be a well lighted, policed and attractive boulevard;

and in connection with the adjacent river or harbor the most pleasing and popular part of the park system of the city.

The toilers of the city, the laboring men and women of the crowded districts situate near by, have not the time, the inclination or the means to seek open-air recreation in more distant parks far up town or out in the country; the beauty and cleanliness of the park system must be brought near to them or they obtain no benefit from it.

I appear, however, not so much as an advocate for the marginal boulevard as for the reclamation of the purity of the harbor and its incorporation into the park system of the city that has the good fortune to have such a body of water at its doors. I will explain my position more clearly, taking the City of Boston as an illustration.

The Boston park system commenced with Boston Common, which sufficed the town and city as a place for open air recreation for two hundred years, or until the middle of the last century, when the rapid growth of the city and its suburbs, and the example of other cities, brought the city park system into favor and lead to its development.

The Boston park system embraces about four square miles of territory and cost the city sixteen million dollars to construct. It embraces the Common, Public Garden, Commonwealth Avenue, Back Bay Fens, Jamaica Pond, Arnold Arboretum, Franklin Park and Field, Columbia Road and the Marine Park, forming a connected system embracing the older city. It includes Charlesbank, North End Park and Wood Island Park, and an intercepting sewer along the whole harbor front that permits the construction of these delightful resorts for open air recreation.

Boston and adjacent municipalities to the number of thirteen cities and twenty-six towns have been united into a Metropolitan Park District, which is practically the Metroplitan Water and Sewerage District, that surrounds Boston Harbor and has a coast line along Boston Bay from Nantasket to Marblehead. It extends inland a dozen miles from the harbor front, and has a population of about thirteen hundred thousand.

Water has been brought to the district from the highlands of central Massachusetts at a cost of twenty-five million dollars; an intercepting sewer drains the northern part of the district and empties at Deer Island at the entrance of the harbor; Boston sewage flows to Moon Island, near the center of the harbor; the southern part of the district at present drains into the center of the southern section of the harbor.

Where the Boston Park system ends the Metropolitan Park system commences. It is laid out on magnificent lines for the benefit of the present and coming generations, and embraces miles of ocean shore line and square miles of forest and hilltops. The district is drained by the Neponset, Charles, Mystic and Saugus rivers, which contribute to the development of the park system, as do the broad, shaded boulevards connecting the widely separated reservations.

I shall not attempt to describe the Boston Metropolitan Parks; they must be seen and studied to be appreciated; and right here I would hint that Boston is one of the most hospitable and attractive convention cities

in the land, and if you cannot gather there collectively the city will welcome you individually with open arms and the glad hand. But I would call your attention to Boston Harbor and its relation to the Boston Metropolitan Park System of which it is the very center and naturally the most pleasing feature.

The Boston Metropolitan Parks have an area of ten thousand acres, or about thirteen square miles; the harbor has an area of about fifty square miles. The park system has twenty-five miles of parkways; the whole harbor is a parkway.

Boston Harbor is practically land-locked, protected from ocean storms by natural barriers, and its surface is broken by numerous islands and irregular shore line formed by bays and coves on the mainland. It should be the most attractive seaside resort in the world, bordered by villas, hotels, camps and club houses. Through the long summer the canoe and sailboat should be seen in every part gliding over the surface, and warships and yachts should be attracted thereto by its safety, its natural beauty, its cleanliness and its sweetness.

In the center of this park-like expanse of water there is to-day a fountain emitting daily a hundred million gallons of putrid nastiness, which floats off with every tide to the physical disgust of everybody brought in contact with it. It is always in evidence.

At the gateway of the harbor there is another fountain of the same character to welcome the stranger to our civilized land. It, also, is always in evidence, as is a third fountain in the center of Quincy Bay.

London has discovered how to abate such a nuisance and has attempted to restore the river Thames to a park-like condition; we know how to do the same in this land, but we procrastinate.

The time has come when public sentiment demands that all pollution should be kept out of our beautiful country parks, our parkways, our marine parks, and the water surrounding them or flowing through them.

By one act of legislation it is possible to add fifty square miles of area to the Metropolitan Park System of Boston, every acre of which would "afford pleasure to the eye as well as opportunity for open air recreation."

In this respect there is a chance for municipal improvement in Boston, and in nearly every American city that is worthy of consideration, for it appeals to all.

Some of you live by the great lakes and broad rivers of the west, where the water at your door is used for commerce, and often as the source of water supply for your own or neighboring municipalities. That water can be made as attractive as the most beautiful section of any city park. It should be so treated in all cases.

We should make every river, every harbor, every lake a pleasure to the eye and to every other sense and thus afford on all water opportunity for open air recreation for the most fastidious person.

THE PRESIDENT: I may say personally I have found Mr.

McClintock's paper one of the most interesting of its kind that I have ever listened to.

Are there any members present who desire to say anything in connection with the subject brought forward?

There being no discussion, we will pass on to the next item of business, which is the report of the Committee on Review. This is one of the most important of all our committees, as you are all aware. The object of this committee is to review and resume what has been done in the way of improvements throughout the country during the year, and the reports of this committee form a most valuable record of what has been done during the several years, in different parts of the country. Mr. Brown is the chairman of this committee, but he informs me that his report is not absolutely completed yet, so we will read it by title, with the agreement of the meeting, and it will be published in the proceedings, and, if desirable, may be discussed at our next meeting.

The report of the Committee on Review is as follows:

COMMITTEE ON REVIEW.

Regarding the cities in the United States, except those in the Atlantic Coast States.

The chairman of this committee was for several years chairman of the Committee on Municipal Data and Statistics and is interested in the question of uniformity in municipal reports. This report will be confined mainly to a consideration of the condition of the various cities of more than 25,000 population in this regard, as shown by their annual reports.

Letters were sent to the mayors and city engineers of all cities having more than 25,000, asking for copies of their annual reports. Seven replies were received stating that reports are not published, others that they are published only at long intervals. These are Dayton, O., Denver, Colo., Elkhart, Ind., Kokomo, Ind., New Orleans, La., City Departments; Omaha, Neb., Seattle, Wash. The fifty-nine cities sending no reports are Akron, O., Bay City, Mich., Birmingham, Ala., Butte, Mont., Canton, O., Cedar Rapids, Ia., Chattanooga, Tenn., Council Bluffs, Ia., Covington, Ky., Dallas, Tex., Davenport, Ia., Des Moines, Ia., Evansville, Ind., Houston, Tex., Dayton, O., Denver, Colo., Dubuque, Ia., E. St. Louis, Ill., Fort Worth, Tex., Galveston, Tex., Houston, Tex., Indianapolis, Ind., Jackson, Mich., Joliet, Ill., Joplin, Mo., Kansas City, Kan., Kansas City, Mo., Knoxville, Tenn., LaCrosse, Wis., Lexington, Ky., Lincoln, Neb., Louisville, Ky., Memphis, Tenn., Milwaukee, Wis., Mobile, Ala., Montgomery, Ala., New

Orleans, La., City Departments; Newport, Ky., Omaha, Neb., Oshkosh, Wis., Pueblo, Colo., Quincy, Ill., Racine, Wis., Rockford, Ill., Sacramento, Cal., Saginaw, Mich., San Antonio Tex., San Francisco, Cal., Seattle, Wash., Sioux City, Ia., South Omaha, Neb., Spokane, Wash., Springfield, Ill., Springfield, O., Superior, Wis., Tacoma, Wash., Terre Haute, Ind., Toledo, O., Topeka, Kan., Youngstown, O. Cleveland stated that last year's report was not yet published and would be sent as soon as issued, but it has not yet been received. Cincinnati sent the report of but one department, that of city engineer.

The following twenty-two cities have sent reports: Anderson, Ind., Cincinnati, O., Detroit, Mich., Duluth, Minn., Ft. Wayne, Ind., Grand Rapids, Mich., Little Rock, Ark., Los Angeles Cal., Minneapolis, Minn., Nashville, Tenn., New Orleans, sewerage and water board, not regular city departments; Oakland, Cal., Peoria, Ill., Portland, Ore., Richmond, Ind., St. Joseph, Mo., St. Louis, Mo., St. Paul, Minn., Salt Lake City, Utah, Shreveport, La., South Bend, Ind. Earlier reports are on hand from Indianapolis, Ind., Cedar Rapids, Ia., Newport, Ky., Kansas City, Mo., Cleveland, O., Milwaukee, Wis.

None of these cities use the standard forms of report adopted by this Society and none of them, except Cleveland, O., uses the form of water works reports adopted by this Society and adopted many years ago in slightly different form by the New England Water Works Association. There is but little similarity in reports even from cities in the same state.

A few of the cities in these lists are of less than 25,000 population, their reports having been on hand for comparison.

Taking a few of the reports received, alphabetically, from the list of cities, the following points from a few of them regarding manner of making the reports and the contents thereof, may be of some interest as examples of the variety of treatment, though few of the items will be very satisfactory in form or contents.

Anderson, Ind., population in 1890, 20,178. 80 pages. City clerk's report 2 pp., contains statements of revenue and its general sources, bonded and floating indebtedness, interest due and balances in funds. Fire chief's report 9 pp. of small details with little of importance. Water works report 4 pp., itemized and classified statement of disbursements and of pipe and hydrants laid. City engineer's report 5 pp., length, kind and total cost of each street improvement since 1891, and summary practically valueless except as a rather indefinite and wholly unclassified statement of the lengths of streets improved. Police superintendent's report 1-9, statement of number of men, salaries and expenses. Health officers' report 2 pp., list of births and causes of death with number of deaths under each. Street commissioner's report, inventory of tools and materials on hand. Gas meter report one-half page, readings on gas meter at beginning and end of year. Garbage report one-half page, barrels of garbage each month, presumably burned, though the only indication of what was done with it is in the one line, "Total amount of garbage consumed in 1903, 30,794." City electrician plant report 2 pp., table of total collec-

tions and disbursements each month of commercial plant, and of receipt from city and disbursements each month for street plant. It is difficult to imagine a more ineffective report, a more useless expenditure of printer's ink than in printing it.

Cedar Rapids, Ia., 1901, population 25,656, has the mayor's address and the city reports. The report of the board of public improvements gives a brief invoice of city property. The city engineer's report gives a history of the paving and a statement of the streets paved, showing location, contractor, date of construction, filling of points, length, width, area, total cost and per square yard, kind of brick, kind of traffic and kind of foundation. The same report shows the length of each size of pipe and number of lampholes, manholes and flush tanks; expenses of department, length of sidewalks, and a table of general improvement statistics, showing a beginning, but being far from the standard form. The council committees on streets and walks and light and water show the totals of expenditures and receipts in their departments. The electrical department reports only that he has difficulties. The police department details its arrests, and the fire department shows the value of property exposed, the total expense for maintenance and a general inventory of the property. The park report is an inventory of property. The cemetery committee, the city attorney, the building committee, the clerk of the Superior Court, the board of health, present mainly inventories. The treasurer's report is one of the totals of accounts without system, and the auditor's report is equally barren of real information. The public library report is a plea for funds.

Aside from the city engineer's report, which is far from complete, the money spent in printing this report might well have been saved, except as it probably shows the fact that no information is obtainable aside from that carried in the memories of the officials.

Cincinnati. Engineer department only received, and that is for 1903, 44 pp., contains list of employes in department, list of improvement ordinances. Areas of districts and parks and lengths of streets and alleys with various surfaces. Tables of improvements completed, giving only statement of limits, contractor, dates, cost to city and total cost. Classified by character of improvements. Monthly cost of street gas lighting and table of sewages in five other cities, the payment in Cincinnati being two-thirds this average per light. Like tables of gasoline lighting. Lengths of brick and pipe sewers constructed during year and total each year since 1871, and number of house connections. Tables of lengths, costs and assessments for each sewer, and of plans adopted. Large table of lengths and sizes and appurtenances. Statement of sizes and kinds of bridges over various creeks, rivers and railroads. Statement of sidewalk work done and supervised. The taxpayer who wishes to know what is done with his money would be almost as ignorant after reading this report as that of Anderson. This is not true of all Cincinnati departments, as the summary table of the water works department was included in one of the reports of the committee of this Society on Municipal Data and

Statistics as an excellent example of a close approach to what is needed in that department.

The water works division of the board of public service of Cleveland, O., 1903, is the only department sending a report. This contains a careful study of the meter question and the effect of meters on pumpage. It shows the cost and valuation of the property.

The summary of statistics is on the standard form. The bookkeeper's report carefully classifies expenditures and gives a comparative table for every year, from 1876 to date. The meter department makes a full report of its operations, also the assessing department. The various assistant engineers report their operations—general. The report of water pipe laid shows only sizes and lengths on each street and side street it is laid on. Totals in use are given in one table. Setting of hydrants and valves requires over fifty pages. The quantities of water pumped by each engine each month and pressures are given in detail and summary. The tunnel is described. The special fire main systems is mentioned. Table of salaries is given. Short reports on electrolysis and tests of coal are made and some tables of tests with gauges of pressures and friction losses are given in full detail. The report ends with a detailed report of cost of construction of the various parts of the system to date. This report needs, in addition to the standard form of reports of operation, which it has adopted, the forms of report of construction and operation details which this Society have adopted.

Columbus, O. Report of chief engineer of public improvements only received, and this for 1902, 183 pp., index and city map, 16 pp. of report discussing the various improvements and plans; 8 pp. of insert illustrations. Tables as follows: Expenses of engineer's department, four items. Miscellaneous contracts completed during year, including location, nature, contractor, amount of contract, amounts paid by city, by special tax and otherwise, and rate per foot, 6 pp. Contracts not completed, 1 p. Streets improved under Brick law, giving location, nature, width, contractor, square yards, price, feet of curb, price, feet of circle curb, price, assessment rate per foot, total length, date completed, years of deferred assessments, total cost, 1 p. Streets improved under other laws, with similar statements, 1 p.

Streets improved under private contract, giving quantities, but not prices, 1 p.

Sewers constructed by contract, giving location, contractor, length of each, size and kind and total length of each sewer, amount of contract, cost of superintending and assessing, total cost and rate per foot, 1 p.

Crossings constructed from repair fund, giving location, length, width, area, cost of labor, material and total cost per lineal foot and per square yard, 5 pp.

Cost of market cleaning, seven items.

Receipt and disbursements of sewer funds appropriated by council, 1 p.

Work done by sewer department in cleaning and repair, 1 p.

Location of new catch basins and manholes, 4 pp.

Construction of catch basins and sewers by department, giving location, cost of labor, material and total for each location, 3 pp.

Peters Run sewer repair, 1 p.

Cleaning catch basins, number and cost—detail, 1 p.

Itemized statement of cost and cost per square foot of cleaning and repainting and reflooring bridges, 2 pp. Cost of repairs of bridges and viaducts, 1 p. Unit prices of labor and materials on bridge and viaduct work, 1 p.

Sidewalk repair work, street repairs. Notification of property owner is still practiced here, 1 p.

Receipts and disbursements on steam road roller, earnings exceeding maintenance, 1 p.

Results of analysis and tests of road materials by U. S. Department of Agriculture, various materials from various dealers therein, 7 pp.

Asphalt repair by streets, showing street, limits, total area, area repaired, per cent repaired, repairs in 4-foot gutter and per cent of total repairs, overlaps, concrete used, square yards, total cost, age of pavements, 2 pp.

Asphalt repairs each street for each year since laid, giving kind of asphalt, area year paved, guaranty, cost each year, total cost to date, years out of guaranty rate per square yard per year, 4 pp.

Maintenance of brick, stone and Hayden block streets, giving location, pavement laid, new material laid and old material relaid, square yards, kind of new material, number of new blocks, pounds of pitch used per 100, cost per square yard, total cost, and part paid by water department, street railway or others, 4 pp.

Repairs to similar streets, giving cost of labor, material, and total for each, 2 pp.

Macadam streets repaired, assessments and rate per foot, 2 pp.

Complete list of streets and alleys improved since 1886 under laws as in above table for year 1902, 20 pp.

Length of street in miles improved each year, since 1887, of each kind of improvement, total square yards and total cost of each kind, 1 p.

Streets improved by private contract, areas and lengths and total length of streets paved under various laws, 1 p.

Length of pipe and brick sewers laid each year since 1853, 1 p.

Length and size of sewer, 1 p.

Streets cleaned and sprinkled, times per week, area, price per sweeping per sq. yd., number of sweepings, estimated cost each of machine and hand cleaning and sprinkling, total cost, balance due, per cent to street railway, amount to street railway, feet front, assessment rate, total assessment, 26 pp., and summary by districts, 1 p.

Widths of roadways and sidewalks established, 1 p.

Dedications of streets and alleys accepted, 1 p.

Additions and subdivisions accepted, 1 p.

Streets and alleys vacated, 1 p.

Rights of way for sewers granted, 1 p.
Lengths of street railway rights of way and track, 7 pp.
Park areas in detail, 1 p.
General statistics, 1 p.
Inventories of property on hand, 20 pp.
Inventory of real estate of city, showing uses, 7 pp.
Report of consulting engineer on proposed new dam, 10 pp.
Maps showing wards and streets repaired during year.

This is a complete and itemized report of all the work done under the department, and it is a pleasure for the investigating engineer to find a report from which he can get so nearly all that he may want. It will be noted that but few of the tables extend back of the year of the report, and better judgment in this regard is shown in this report than is often shown.

Detroit. A volume three inches thick, each report independently paged and printed and the order, only, given in the table of contents. Mayor's message discusses the various city problems and gives its financial condition. The comptroller's report is thoroughly classified, detailed and summarized and gives in full detail the indebtedness, sinking fund investments and full details and summaries of all receipts and disbursements of all the various funds and comparisons with other years, and could scarcely be more complete. The sinking funds apparently own all the special assessment bonds issued. Estimates for the next year are also given. The report has 322 pages.

The city treasurer's report is equally satisfactory and occupies 59 pages.

The corporation counsel gives the detail of legal affairs in 32 pages.

The report of the board of education has 166 pages.

The department of public works report takes 43 pages. It is limited largely to statements of lenghts of improvements and total costs, the tables of sewers going into more detail and the tables of streets paved and repaired also being somewhat fuller.

The water commissioners occupy 96 pages. Twenty pages are devoted to a historical sketch, 18 to the classified receipts and disbursements in the secretary's report, seven to the general manager, who gives a page of summary of data which might very easily have been added to and put into the standard form. The civil engineer discusses his problems and gives some valuable data. The meter superintendent, the chief pumping engineer and the superintendent of construction give fully detailed reports of their work. The fire commission report occupies 122 pages and the police commissioner 140 pages. The public lighting commission requires 82 pages to give a description of its system, the cost of the plant, classified by years and by kind of lights, depreciation, distribution of lights, cost of coal, labor, operation supplies, in full detail of classification for each month of the year. It seems to be in sufficient detail to show the exact cost of everything at any given time. The laws governing the department are also given.

The commissioner of parks and boulevards gives a beautifully illustrated statement of the attraction of the parks and apparently full reports of expenditures in arrangements showing the comptroller's influence upon their forms, 74 pp.

The board of health, 92 pp.

Power commissioners, 88 pp.

Public library, 37 pp.; recorder's, court clerk, 22 pp., and house of correction, 27 pp., complete the book.

The city is in fairly satisfactory condition as regards making of reports and could adopt the standard forms of report almost without labor. The methods of keeping accounts are such that the standard forms could be used quite as readily as those used. There are some additional items in the standard forms which it would be advantageous to add to the Detroit reports, particularly that of its department of public works.

These remarks give a fair idea of the variations in quality of reports which will be found in going through a pile of them collected from cities of various sizes in any part of the country. Specially good features will be found in each report of the larger cities, but two cities seldom happen to hit on the same item for elaboration and never hit upon the same form unless it is laid down by law.

Special attention is called, however, to the excellencies of the report of Duluth and Minneapolis, Minn. The Minneapolis system of accounts has been described to this Convention by one of those instrumental in establishing it. The city engineers and water and light boards seem to have imbibed some of the same spirit, and while their reports are not always as thorough as those of the financial departments they are much above the average of such reports and only lack the conformity to a common standard to make them models in fact as they are in spirit. What is needed is detail and accuracy in the reports of what is done equal to those used in the financial reports.

The labors of the Committee on Review would be greatly reduced by the adoption of these uniform forms of report and steps toward making known the work which this Society has done in this line are recommended by this committee.

Perhaps of the collection of a city's statistics none put in the hands of a single official, with power to require forms of report, if not of accounting, would help to bring order out of the present chaos.

The later developments in municipal improvement are taking the line of beautifying the cities. The "group plan" is a popular proposition at this time. None of these have progressed very far at the present time, but several are nearing the stage of beginning actual construction.

One of the most elaborate of these plans is that of Cleveland. It proposes the groupings of the new public buildings which must be constructed shortly, the ends of a parkway, the purchase of the property on each side of the parkway and its resale under restriction so that the adjoining business blocks will be in conformity with the designs for the public buildings, and bridges over the tracks at the entrance to the city

from the railroads leading to a park area, along the lake shore. The land for the public buildings has already been secured and contracts with the railroads and purchase of other property desired are under consideration.

St. Louis has recently proposed an equally elaborate scheme, not far different in general design, which has not yet progressed beyond the stage of preliminary plans.

New York has had an ambitious proposition under discussion for the new city buildings, especially as regards the height of one of the buildings.

A plan for the construction of certain new public and semi-public buildings in certain locations to form parts of an organic whole has been proposed for Indianapolis, by a member of this Society, but this also is only in the preliminary stage, no drawings having been prepared.

The Cleveland and St. Louis plans have been prepared by commissioners and the plans of building in New York must be approved by a Municipal Art Commission. These commissions demonstrate the development of the idea of beauty in the American city and are the first steps toward an intelligent control of public art and architecture which is bound to result in greater unity in architectural ideas for both public and private dwellings. We have a race of people—American originally, heterogeneous in origin and characteristics. This condition shows in the lack of unity and stability of our architecture, both public and private. The fusing of these elements into a homogeneous whole is progressing and is showing first in the reaching out after better plans for our public buildings, and will be followed by similar efforts regarding private buildings. Cities generally need municipal art commissions like those making the preliminary plans for the Cleveland and St. Louis "Groups" and the Bridge and Stream Improvement Commission of Indianapolis, but with the greater field and the greater powers which belong to New York. Municipal Art Commissions supplemented by power to advise, if not to control private structures in prominent places and where they will affect the appearance of public improvements.

CHAS. CARROLL BROWN,
Chairman.

THE PRESIDENT: Before we adjourn there is another paper entitled "A Review of Municipal Work in the Atlantic Coast States Since 1880." Mr. Hatton is not here at the moment, and as the hour is somewhat late, I think it would be as well for us to read his paper by title only, and have it printed in the proceedings.

Mr. Hatton's paper is as follows:

A REVIEW OF MUNICIPAL WORK IN THE ATLANTIC COAST STATES SINCE 1880.

The writer had in his mind, when he was requested by the chairman of the Committee on Review to prepare a paper reviewing the municipal work done in the Atlantic Coast States, to give actual figures showing the amount of the important work done in this line since 1880 by the larger cities in the East, and for the purpose of obtaining the statistics at first hand, he prepared and sent out sixty-five circular letters to the mayors of that number of cities, from which he received just sixteen replies, which were insufficient to enable him to carry out his purpose. However, by referring to the United States Census Reports for 1900, and to that most excellent compilation of municipal statistics, The Municipal Year Book for 1902, as edited by M. N. Baker and published by The Engineer News Publishing Company, and by hurried inquiries to several associates, the writer has been able to partially cover the subject matter, which, being in a condensed form, he hopes may prove of interest and benefit to the members of this Convention.

The municipal improvement of first importance has been the development and construction of public water supplies, and the measures taken for supplying pure water, and protecting the sources of supply against possible pollution. In 1900 there were 656 cities and towns in the Atlantic Coast States, having a population of 3,000 or over, which had a public water supply either operated by the municipalities or owned and operated by a company under a franchise. Since then the writer learns that there have been built thirty-seven new plants, making a total of 693 plants. Most of these plants have been largely improved by extensions to the distribution systems, increasing the power to deliver the water, enlarging the reservoir capacity, and what is most important, many of them have had added some system by which the water was purified before being delivered to the consumer. Prior to 1880 but little thought was given to the purification of water for domestic use, but since that time there have been built 151 water purification plants in as many cities and towns in the Atlantic Coast States. The greater number of these plants have been constructed for water works which are operated under a franchise, apparently indicating that communities are much more particular as to the quality of water used when it is supplied by private interests than they are where they have to pay the bill for purification methods themselves. The greater number of the purification plants are operated by the mechanical filtration process, and a few are operated by slow sand process and by coagulation, sedimentation, filter cribs and by softening process. The largest plant which has so far been constructed for the purification of a domestic water supply is the one which is now nearing completion at Philadelphia, Pa., and the next in size is the one about completed at Washington, D. C. Both of these plants are built upon similar lines and are worthy of a visit from any member of this Society, as being the most improved type of slow sand purifiers in this country, if not in the

world. The class of work done at both plants is as fine as the writer has ever examined, and in spite of the investigation now going on in the Philadelphia plant, it seems certain to the writer's acquaintances who have carefully examined the plant that but few flaws will be found in the construction, or in the materials used. The cost of this plant to date has been about $22,500,000, and it is estimated that it will require about $4,000,000 additional to complete it. The minor portion of the filters are already in use, and are supplying a portion of the city with reasonably pure and wholesome water from a highly polluted source. A large portion of the Washington filter plant has been completed, but not yet put in operation.

Among the larger water purification plants in the East might be mentioned the one which filters a portion of the New York City supply, Boston, Albany, Lawrence, Binghamton, Elmira, Poughkeepsie, Hoboken, Paterson, Allegheny, Chester, New Castle, Wilkes-Barre, York, Norfolk, and Atlanta. One of the most recent and best equipped mechanical filter plants is the one constructed at Little Falls, N. J., and is well worthy of inspection. But a few years ago the number of municipal filter plants could have been counted upon the fingers of two hands, but since 1890 the feeling has firmly taken hold of the citizens of the Eastern municipalities that their first duty is to provide pure and wholesome water for domestic supply, and that the time, money and labor expended for this purpose has been of great advantage to this country is best exemplified by the large decrease in the annual death rate from water borne diseases since 1895.

Twenty years ago the average citizen of this country looked upon typhoid fever as a punishment sent by Providence which could not be avoided but must be endured; now, however, the most ignorant have a well fixed idea that the disease can be easily prevented by protecting themselves against an impure water supply. The Indians of the Southwest used to think that smallpox was sent by their Deity as a punishment for their sins, but they have recently found out that man can prevent the punishment by very simple methods.

The improvements made to the source of water supplies during the last decade have been numerous. For instance, the large impounding dams built by the City of New York for insuring a supply of water during dry weather can hardly be duplicated anywhere in this country. The system of impounding reservoirs built by the City of Boston to preserve its water supply are good examples of how the American cities are providing for their future water supplies, while many minor cities of Pennsylvania have built impounding reservoirs of much magnitude, few of which are ever described in technical journals.

Coincident with the measures taken for the purification of the water for domestic purposes has been the works undertaken by the cities of the Atlantic Coast States for the proper disposition of this water after it has been soiled by use, and sewerage systems of great magnitude and costing enormous sums of money have been constructed. Prior to 1880,

with but few exceptions, sewers were principally built by cities and towns for carrying off the storm water, and incidentally they were used to carry off the liquid household and manufacturing wastes. The writer has knowledge of eight of the larger towns, one a city of over 300,000 population, which up to a few years ago prohibited by ordinance the discharging of any sewage into the sewers of the municipalities. Few sewer systems were designed as an intelligent whole, but were mostly designed and constructed for the immediate needs. The larger cities carried the storm water and sewage through the same conduits to the nearest available natural water course, which soon became merely an open sewer, polluting the atmosphere in its vicinity, and frequently the domestic water supply of a neighboring city further down the stream.

For some years past, however, communities have been realizing that the primary use for sewers is to carry off underground the liquid wastes and that it is the duty of those contributing sewage to so dispose of it that it may never become a nuisance to themselves nor to their neighbors, and that the disposition of the storm water is of secondary importance. The result has been that sanitary sewers have been built in all the larger Eastern cities to a greater or less extent so as to afford all the inhabitants ample sewerage facilities, and the smaller towns and mere villages are rapidly following suit. In fact, it is the exception at the present day to find a town of 3,000 population or over in the Atlantic Coast States where sewers have not already been constructed or a system is being strongly talked of. From the indications suggested by the replies to his circular letter sent to the several Eastern cities, the writer believes that there have been more miles of sewers built in the Eastern cities since 1890 than water mains and that the money expended for them has been of a larger amount than for any other municipal improvement except street pavements.

So far as the writer has been able to learn there have been constructed since 1880 in the cities of the Atlantic Coast States eighty-three municipal plants for the purification of sewage, or more than one-half as many sewage purification plants as domestic water purification plants. In the early days of sewage purification in this country the process most generally used was intermittent filtration, and several large and fairly well operated plants were constructed on these lines. There are thirteen such plants in operation in Massachusetts alone, the largest of which is the one at Brockton. For a time chemical precipitation was a popular method of disposing of sewage and several such plants were constructed in the New England States and in New York and New Jersey. The largest plant in existence in this country, if not in the world, is the one at Providence, R. I., which has recently been completed and which provides for the purification of all the sewage from the city and a portion of the storm water, represented by the first washings of the street surfaces. The chemical precipitation plant which has no doubt contributed the most information to the United States upon that process of purification is the one at Worcester, Masss., which has been intelligently operated for

a number of years. Among the larger sewerage purification plants in operation in the Eastern cities might be mentioned those in Clinton and Marlboro, Mass., Central Falls, Pawtucket and Woonsocket, R. I., Meriden and Danbury, Conn., Kingston, New Rochelle, New York City and White Plains, N. Y., Long Branch and Plainfield, N. J., Altoona and Reading, Pa., and Wilmington, N. C.

The process which in recent years has become the most popular is the septic tank, with or without subsequent filtration, through contact beds, sand or ground. So far as the writer has been able to learn there are at the present time some thirty-eight such plants under construction in the East. The cheapness of construction and operation has appealed to the average city father, hence the great popularity of this process.

The major portion of sewerage purification works have been constructed in Massachusetts, Connecticut and Rhode Island, owing, no doubt, to the dense population and the abundance of surface water supplies. The States of New York, New Jersey and Pennsylvania are rapidly coming to the front, however, and are insisting that crude sewage cannot be discharged into the natural water courses of the states. Excellent laws have recently been enacted in these three states which make it obligatory upon a municipality to purify its sewage by some approved method before dumping it into the streams, and within a few years the writer believes there will be but few cities and towns in these states which do not practice sewage purification. The question has not yet been seriously taken up in the Southern cities, for the reason, no doubt, that the population is much less dense and sewerage systems are just being constructed, but the Southern cities are making rapid strides in municipal improvement and the day is not far distant when the Southern States will pass such health laws as will amply protect their streams.

More of the public's money has been expended in securing improved street surfaces since 1880 than for any other municipal purpose, and since that time the cities of the East have assumed a far different appearance. Hundreds of miles of granite block, fire brick, street asphalt and bituminous macadam have been used, laid upon all kinds of foundations and costing millions of dollars. Of these several classes of materials mentioned granite blocks have been used where the traction is heavy and upon a restricted area; sheet asphalt in the retail districts of a city and in some of the residential portions; bituminous macadam and fire brick have been principally used in the residential sections. Aside from these permanent pavements, many miles of macadam and telford roadways have been constructed in suburban districts. From information received from the several cities heard from the cost of the several classes of pavements referred to, except bituminous macadam, which is a comparatively new class, is about thirty per centum less than it was in 1890, although the cost of labor has materially increased since then. In the writer's judgment the decrease in cost is due to the manufacturer and producer taking less profit for his goods and the contractor less profit for his labor. It would take up too much space in this paper to specify the beautifully paved

streets in most of the Eastern cities, but he cannot refrain from mentioning those of Boston, New York, Brooklyn, Providence, Newark, Trenton, Philadelphia, Baltimore, Washington and Atlanta, Ga., as being samples of well paved cities, nor can he refrain from calling attention to the general cleanliness of the streets of these cities. Prior to 1880 the cleaning of the streets of our Eastern cities was a spasmodic occurrence, usually done during the day when those whose duties kept them upon the streets usually received large volumes of the dirt and dust stirred up by the brooms. But now the streets are regularly and systematically cleaned so as to be of as little nuisance to the citizens as possible. Prior to 1880 every city of any size in the East had its slum, and they were slums, indeed. The municipality did not seem to realize the duty it owed to itself to look after the cleanliness of this district, and the streets were poorly paved, if paved at all, more rarely cleaned, and poorly lighted. It seemed to be a question of dollars and cents to the city fathers; that is, there was but little taxes gathered from the inhabitants of these slums, hence they did not deserve the improvements which were enjoyed by the rest of the community which paid the bulk of the taxes. Now, however, the authorities recognize the fact that they are protecting the health of the whole community by making the surroundings of those who must necessarily live in the slums as clean as possible, the result has been that but few of the old-fashioned slums can at this time be found in any of the larger eastern cities. And some have even gone so far as to exercise a judicious supervision over the interior of the homes of this careless class, compelling cleanliness. This condition has been brought about largely by philanthropic work, but the conscientious city officer has had his just share in it by first providing sewers, street paving and lights to these districts and thus educating the inhabitants in a practical manner how their conditions might be bettered.

One of the greatest improvements in municipal affairs since 1880 has been the lighting of the streets. Prior to 1880 there were but few electric lighting plants in the United States, most of the street lighting being done by gas or coal oil, and even these lights gave little illumination, and the going through the streets of a city at night was not much better than traveling on a country highway. Since 1890, however, cities and towns and nearly every village of the Atlantic Coast States are lighted to a greater or less extent by electricity and the majority by arc lights of large candle power. The young man or woman twenty years of age or less cannot conceive of the change in conditions these increased lighting facilities has resulted in; nor can he of more mature years realize it until he recalls that when he was a young man it was a rare thing to see his women folks upon the streets of his city at night without an ascort. Now our nights are almost like the day and our chief recreations are enjoyed after dark, a condition which is no doubt the result of our improved lighting facilities. To give an idea of how the business of electric lighting has grown since 1890, the writer takes from his replies received from the cities written to the following information:

One city which in 1890 had 1,125 arc lights now has 3,731.
One city which in 1890 had 195 arc lights now has 2,800.
One city which in 1890 had 50 arc lights now has 989.
One city which in 1890 had 94 arc lights now has 811.
One city which in 1890 had 587 arc lights now has 1,906.
One city which in 1890 had 149 arc lights now has 329.

The cost of lighting with electricity has decreased about 30 per centum since 1890, and a still further decrease is expected.

For many years the maintenance of the wires upon poles throughout the densely populated cities was a menace to life, as these wires carried a deadly current and were constantly liable to be broken and come into contact with man or beast; but since 1890 in most of the larger cities and in many of the smaller ones these wires have been placed underground in conduits built either by the companies owning them or by the municipalities and rented to the companies. For instance, in Washington, D. C., no wires are allowed to be strung above ground upon or over the streets, and in many sections of New York City, Philadelphia and Boston the same is true. Baltimore has for years been constructing an intricate system of conduits for carrying the wires, and will soon have it completed. It is perhaps the best sample of a conduit system in existence in the Eastern cities.

Coexistent with electric lighting is the electric railway systems of the Eastern cities. In 1880 there was no such thing as a "trolley car," and those who traveled by public conveyance through the streets of a city were forced to patronize the now unfamiliar horse and mule tram car, still sometimes seen in New York City, when, to the writer's little daughter it was the most curious sight she witnessed during a recent visit there. Now every city and town has its extensive trolley system which gives as good transportation facilities as the steam car gave three decades ago And the trolley car has been relegated to the rear in some of the larger cities where distances have become great, and the rapid transit subways are the thing of the present and future The Boston subway is the first venture in this line in this country, and is a magnificent sample of engineering. The usefulness of this property was soon made manifest to the city officers of all large cities, and within a few years after Boston's venture New York City constructed the first portion of its subway system through which a passenger is carried through or under the city as rapidly as though he was out in the country districts. The New York subway system has just been begun and its extensions as outlined at the present time will cover a great portion of the island and reach into Brooklyn, and heaven of the overworked street car horse of New York is in sight. The engineering feats accomplished and the obstacles overcome in the successful building of the New York subway have never been paralleled in the world, and for many years to come will stand forth as the most tremendous undertaking of any municipality in the world, for it is a purely municipal undertaking built by the City of New York and leased for a term of years to the present operators. The subway at Phila-

delphia is being rapidly built, and although a large and expensive piece of work is but a simple proposition when compared with the New York subway and unlike the latter is being built by a private corporation, and for the present time, at least, with a view only of assisting rapid transit on Market street, the principal thoroughfare of the city, where more street cars run on the surface per hour than upon the street of any other city in America. The City of Pittsburg is now contemplating giving franchises for the construction and operation of an underground subway for electric cars, and by the end of another decade we may expect to go to our suburban homes by means of underground railways instead of by surface tracks.

A much needed municipal improvement which has not kept pace with the rapid development of the cities of the East is the proper disposal of the garbage, and there is perhaps no question to-day which is giving the municipal officer more concern than this very question. For several years past many systems of disposing of the garbage of cities have been introduced and tried with some success. These systems have been patented by the several inventors, many of whom knew little about the matter, and as a whole they are conceived, built and operated upon purely unscientific methods. So far as the writer knows there are at present being operated about eighty-eight plants in as many cities of the Atlantic Coast States for the reduction, cremation or other artificial disposition of garbage. Some of those he has visited are performing the work in a fairly sucessful manner, but the majority seem far from perfect. It seems that there is a wide and useful field for the scientific and sanitary expert in garbage disposal, and many cities in the writer's knowledge would welcome the introduction of a garbage plant that could be relied upon to perform the services required within a reasonable expense. From data secured from the several plants visited by the writer at various times there is no uniform ratio between the amount of garbage disposed of and the cost per ton. This may be largely the result of ignorant management of the plants, and not so much from the design of the process, as it has occurred to the writer that the most inefficient class of labor is employed in this work. As the cities grow the garbage grows and the question becomes more serious and but few cities in the East have met it squarely.

A review of municipal work in the cities of the Atlantic Coast States is one of large magnitude, and to cover the question perfectly would require much more time and a greater length of paper than the Society would care to have. The writer would have liked to touched upon the improved methods of plumbing regulations as adopted by most Eastern cities during the past few years, showing what advances have been made in this particular towards the protection of the public's health. He would also like to have dealt in a similar way with the improved building regulations which have become necessary by reason of the construction of the modern office building, the installation of public parks throughout this section of the country, and the improvements to private premises which

always follow public improvements, and many other features which are fit and interesting subjects for review, but space forbids that these be more than mentioned.

The bulk of municipal improvements in the Atlantic Coast States has been in the New England States, New York follows closely and New Jersey and Pennsylvania are not far behind. Maryland and Virginia are getting into the procession and the Carolinas, Georgia and Florida are just beginning, but the fever is there, and in another decade the South will be able to offer the homeseeker just as comfortable surroundings as can be found anywhere upon this continent. To the writer it seems that public progress has kept pace with private improvements in spite of the handicap which politics always places upon it.

Very respectfully submitted by

T. CHALKLEY HATTON,

Member of the Committee on Review.

The meeting thereafter adjourned.

THIRD SESSION.

The third session was called to order at 8:25 Wednesday evening, September 6th.

The first order of business was the report of the Committee on Street Paving. Mr. C. D. Pollock, Brooklyn, N. Y., chairman of the committee, presented the following report:

REPORT OF COMMITTEE ON STREET PAVING.

Nothing startling in the way of new pavements has been developed during the past year.

The progress has been in attempts to improve pavements and to cheapen the cost of construction of our standard pavements, and also the repairing of them.

Your committee has secured a paper on the organization required for the proper maintaining of pavements. Very little has been written on this subject, or at least put into tangible shape. We hope that this paper will bring out valuable discussion.

The Department of Commerce and Labor published a circular last April compiled from consular reports describing glass paving and building bricks. These have been used to a small extent, principally in Germany and France, for paving purposes, but more generally as tiles.

Much interest has been taken in the use of oil on macadam pavements. Pavements of macadam are cheap in first cost, but as repairs begin as soon as the pavement is completed, the maintenance is very high, making it actually an expensive pavement. For the proper maintenance of macadam and the comfort of those driving on this pavement sprinkling is imperative. This in itself is a big expense.

If the use of oil will save the sprinkling with water and can be used at a reasonable cost, the cities and towns having much macadam to maintain should know more about this subject.

Numerous localities have tried sprinkling oil over macadam, but we have learned of no very successful attempts in the East.

The failures here may have been through the use of the wrong oil, or through improper manipulation, or both.

California has had marked success with oil in many places. Her engineers have made careful trials until they seem to have hit upon the proper method and the right oil. We are very glad to have secured the paper on this subject from Mr. Theodore F. White of Los Angeles, Cal., a man of large experience in this method of road building.

We have secured another paper in connection with macadam, a paper on gutters and cross-walks for this pavement. These are always hard to arrange satisfactorily with a soft pavement surface and any help on this matter should be welcomed.

We hoped to have secured a paper on the action of water on asphalts, but owing to various causes we found it impossible for this year. However, this is a good subject and we recommend it to the consideration of your next committee.

Last year your committee presented a paper on a "Municipal Laboratory for Testing Materials," this year we have a paper on the importance of this testing.

We will not take any more time, as we know you wish to hear the papers instead.

Respectfully submitted,

C. D. POLLOCK,
Chairman.

THE PRESIDENT: The papers which this committee have to present are one by Mr. Stewart, who is in town here, another by Mr. Fort, who is not in the city, I understand, and another by Mr. Howard. I understand that there is also a paper by Mr. Theodore F. White of California.

According to our rule, none of those papers should be read till the authors are present to read them, but perhaps it would be the pleasure of the meeting to have the Secretary make an exception in this case and read those papers, because this is a very

important subject, and I understand that all the papers are very interesting.

MR. RUST: I would move that an exception be made in this instance, and that the Secretary read the papers of such gentlemen as are not here, in connection with this subject.

This motion being agreed to, the Secretary read the following paper, contributed by Mr. Theodore F. White, Los Angeles, California:

THE USE OF OIL ON MACADAM PAVEMENTS.

BY THEODORE F. WHITE, LOS ANGELES, CALIFORNIA, MEMBER OF THE ADVISORY COMMITTEE, NATIONAL GOOD ROADS ASSOCIATION.

Mr. T. D. Allin, city engineer of Pasadena, Cal., with whom I had a very pleasant acquaintance for a number of years, has forwarded me your chairman's letter to him of July 20th, in reference to preparing a paper or furnishing data on "The Use of Oil on Macadam Pavements," requesting me to take the matter up, as he did not feel able to do so, on account of lack of time and poor health. I regret the cause of Mr. Allin not complying with your request, for he has given the use of oil on streets and roads much study, and his experience fits him for handling the subject. However, the writer will endeavor to touch upon some points in this class of road construction, deduced from his experience of several years in this connection.

The oiling of roads and streets in California first began to attract particular attention about six years ago, when petroleum oil was used in Los Angeles county in a small way in 1898, and more in 1899, followed by San Bernardino county in 1899, when the writer was a member of the board of supervisors of that county, and by virtue of his office one of the road commissioners.

The first use of oil on roads had for its object the laying of dust, which was almost unbearable during the long dry summers of California. It was used for this purpose instead of water, sufficient quantities of the latter being difficult to obtain in some sections, and it was thought that the oil would have a more lasting effect, and so be more effectual and economical for this purpose. It was found to be an excellent dust layer. All grades of oil were used, from high gravity, containing but a small quantity of asphaltum, and charged with water and sediment, to heavy oil, free from water, and very rich in asphaltic base. No attempt was made in the beginning to obtain a hard, smooth-surfaced road. The idea was to mix the oil with the natural loose surface dirt of the road in sufficient quantity to make it heavy, so that the dust would not rise. It was thought that it would be a waste of material to use oil on a loose sandy road, that it would simply sink into the sand and disappear, and if

used on a hard surface like macadam it would not penetrate, but run off into the gutters. Even the parties who claimed to be the discoverers of this use of oil, and to have a patent on its use, (but who have never been able to substantiate their claims) said that there must be a loose covering of at least an inch in depth on the road to mix with the oil.

One of the first things noticed was that the larger the percentage of asphaltum and oil, the firmer it made the surface of the road, and so the better the results. Another was that if the oil was worked in deep, especially in clay soil, it made a spongy roadbed that was very heavy for hauling over, and that the oiled layer became rutted and ridged and very uneven. There are miles of just such roads in California to-day. Teamsters condemn them, and they are very unsatisfactory, on account of their unevenness, for even light rigs. It was found that sandy and gravelly surfaces absorbed the oil readily, and became very hard if a heavy asphaltic oil was used; that even loose drift sand, while it took a large quantity of oil, put on in a number of applications, and considerable time to set and harden, could be converted into a smooth, hard-surfaced roadbed. But an absorbent, hard compacted gravel surface, it was found, made an ideal oiled road, when a heavy asphaltic liquid was used. This led up to the use of this kind of oil upon macadam roads, and now we are building what we call "liquid asphalt" roads and streets, giving careful attention to all details of carefully preparing the sub-grade, putting down the crushed rock layers, filler, etc., and thoroughly compacting this base to a hard, smooth, properly shaped surface, to receive the oiled, or rather asphaltic covering, and obtaining a result that is very similar to the regulation asphalt pavement, hard, but not quite so hard and smooth as the latter, but furnishing a better footing for the horse. A surface that does not get slippery in wet weather, a surface that is slightly elastic, very pleasant to travel over, and which effectually preserves the macadam below.

The construction of this "asphalted macadam" road or street involves the careful building of the macadam base, acording to the most approved specifications for this work, attention being given to proper drainage and to the crowning of the surface. It must be remembered that this base supports the load that goes over it, and that the superimposed asphalted layer is a comparatively thin, slightly elastic, protective covering that takes the surface wear.

The macadam base in this climate is made from four to six inches in thickness, acording to the firmnes of the sub-grade, and the load which the road has to carry. It should have a cross section that will insure the storm water reaching the gutters soon after it falls, and the surface should be smooth and even, without depressions. Catch basins on the surface, where the water will stand, would be a very serious defect in this kind of roadbed. The constant travel over the spots covered with water would cut through the surface layer, and unless repaired, a hole would form.

Granite, trap and limestone are commonly used in this macadam. A dense limestone is excellent for this purpose It can be compacted into an unyielding base without voids, while the asphalted layer protects it from the abrasion of travel.

After the macadam base has been carefully prepared, the most approved plan for putting on the liquid asphalt covering is as follows: The surface of the base being free from all debris or loose material, clean, smooth and hard, a thin layer ¼ to ⅜ inch thick, of fine angular gravel, or coarse, sharp, clean sand is spread upon it evenly and of the exact thickness required. Upon this is applied the liquid asphalt or heavy asphaltic oil, put on at a temperature of not less than 150° F and in quantity ⅜ to ¾ of a gallon per square yard. The liquid is likewise put on by a machine that spreads it evenly over every particle of the surface, and in the exact quantity required. It is desirable to let the liquid remain for at least twenty-four hours without being disturbed, under the warm rays of the sun, that it may penetrate the base as far as possible, to secure a good bond between the base and covering. Then another thin layer of the sand or gravel is spread over the surface, and a second application of the hot liquid is put on like the first, from ⅜ to ½ gallon per square yard. This is followed by a third layer of the sand or gravel, sufficient to completely fill the liquid with grit, and leave no stickiness upon the surface. Sometimes a plank "smoother," 6 feet long, made of 2x8 or 2x10 inch hardwood plank, put together ship-lap fashion, is run over the surface, lengthwise, crosswise and diagonally after the second application of the liquid, before the third sanding, if the liquid does not pick up, but *after* the third sanding, if it does, to more thoroughly mix and pulverize any large particles of the gravel layer. If the "smoother" is run over the surface after the third graveling or sanding, then another light sanding is put on after the smoothing. This is to prevent particles of the oiled layer, while it is still "green," from adhering to the wheels of vehicles or to the feet of horses traveling over it.

As soon as the last layer of gravel or sand is put on, a light or medium weight roller may be run over the surface, and the road or street may be thrown open to travel. If the travel on the street is considerable, the rolling just previous to throwing it open may be omitted. After the street is so thrown open should any "wet" spots develop from there being an excess of the liquid, a little more sand should be put on, just sufficient to take up the liquid and remove all stickiness.

After the street has been traveled two or three weeks, should the surface not be entirely smooth, then a medium weight roller, say 2,000 lbs. to the foot-width, may be run over it with much benefit, to iron out the uneveness and little creases made by travel. This rolling may be repeated at intervals of two or three weeks, for a number of times during the hardening process, but it is frequently omitted altogether. The travel, if considerable, will work the surface down smooth, but the rolling will make a better looking job. The result is a smooth, firm, rubbery

asphaltic surface, that continues to harden for some months after the work is done, until it becomes as hard and almost as smooth as an asphalt pavement. In fact, it is an asphalt pavement, but got at a small fraction of the cost of the regulation pavement made with hard asphaltum.

The asphaltum being used in liquid form on the macadam, as above described, takes much longer to set and harden than in the pavement, where the "D" grade asphalt is used; on the other hand the liquid asphalt has none of the properties that go to make asphalt a good paving material, injured by a high degree of heat, which sometimes happens in reducing it to the hard form. It has, therefore, a longer life and more elasticity after it does set and harden than some of the hard asphalts.

The liquid used to secure the best results has a gravity of about 10.5° B. and contains over 80% of "D" grade asphaltum, over 90% of asphaltum in liquid form, and comes from what is called the "Sunset" Fields, near Bakersfield, California. A sample of this liquid recently submitted to a careful test showed as follows:

Gravity, at 60° F	10.3 degrees B
Water	None
Volatile, when heated to 400° F for a period of 10 hours	17.2%
It was then reduced to asphaltum having a penetration of 55°	82.8%
This is equivalent to liquid asphalt	90.0% plus

It is to be noted that commercial "D" grade or hard asphalt has a penetration of about 60° so that the above 82.8% was a little harder than the commercial hard asphalt.

The fine gravel or coarse sand used with the liquid should have good wearing qualities and be sharp and angular. The nearer it is to pure silex the better. The idea of the liquid-asphalt-gravel surfacing is that the asphalt is simply a slightly elastic cement to hold the grit with which it is filled together, to make a durable wearing surface and protect the supporting base below. In building a street as above described, after the base is prepared, it is absolutely necessary to keep travel off the portion being treated with the liquid. If the street cannot be closed altogether, then one side should be worked at a time, keeping the travel off this until it is finished, ready to throw open to the public before the other is undertaken.

It may be pointed out that our experience with this class of roads and streets has heretofore been mostly in the climate of California, and they have been built during the summer season, when it is dry and warm. It is important that the surface of the base be dry, and better warm, when the liquid is applied, otherwise a good bond will not be secured and the covering will be inclined to peel off. It is therefore sugested that in building such a road in a climate where there are frequent rains that the liquid be put on during a warm dry period, when rain is not liable

to fall during its application. After the liquid is spread and it is filled with gravel or sand the rain will do little harm.

Examples of asphalt-macadam roads and streets can now be found in a number of places in California. Probably the first was built by the writer and a fellow member of the board of supervisors of San Bernardino County, between the City of San Bernardino and Colton, in 1900. Riverside now has miles of streets so covered that are noted for their excellence. Los Angeles has lately adopted specifications for this class of work, and other cities and towns are following suit.

THE PRESIDENT: It seems to me that it would be better to discuss each paper as it is read. Of course, if the members think differently, why, they have only to say so.

There being no dissenting voice, I will declare Mr. White's paper on the "Use of Oil on Macadam Pavements" open for discussion.

MR. EGGERS: I would like to ask what the cost of a square yard would be under that process?

MR. POLLOCK: Mr. White does not state in his paper what the cost is. Of course, it would be very different in California from what it is here. You would have the cost of the transportation of the oil, and the difference in labor conditions, and so on.

Mr. White says that it is but a small fraction of the cost of an ordinary asphalt pavement in California, and as you know they have asphalt, as well as asphalt oils right there on the ground.

MR. EGGERS: It would be interesting to have some details as to the cost.

MR. TILLSON: About the Fourth of July I had occasion to make a short automobile trip through Long Island, and on part of the journey we went over the roads that had been used for the Vanderbilt races, by the automobilists—those roads had been oiled, and I was so much pleased with them that after I returned to the city I wrote to several people in connection with the matter, and after considerable correspondence I got in touch with the contractors who did the oiling.

They told me that they used ordinary oil on the streets, which had cost them seven cents per gallon, where the haul was about

two miles. They used from one to three thousand gallons per mile, making the cost of the oil run from seventy to two hundred and ten dollars per mile.

Just how long that oil will last I was not able to find out, but, I was so favorably impressed with the result as I saw it that I hope to be able to go out there again shortly, when they are going to have another of those races, and when the roads will be completed, and perhaps will be able to get all the information I want on the point.

A MEMBER: Is it petroleum they used?

MR. TILLSON: Yes.

MR. POLLOCK: Mr. White's paper refers to asphaltic oils.

MR. TILLSON: The oils of California have an asphalt base, while those of Pennsylvania have a paraffine base. I do not think, personally, that the paraffine oils will last as long as the asphaltic oils, and I hardly think that we could use it to advantage on our city streets.

We have a great many macadam roads that we could sprinkle with oil—roads that are not built up in the suburban part of the borough, and that is where I hope to be able to use it to advantage, and get good results.

From the information that I have been able to get from those people who have used oil on roads, it is necessary to have quite a lot of dust on the road, so as to form a sort of crust, and create a crude asphalt pavement.

Of course when the oil is first applied there is bound to be a certain amount that will be tracked up, and for that reason I have never heard of it being used successfully for city streets. However, next spring I expect to be able to try it, and I hope that the results will be as satisfactory as I look forward to.

MR. BARLOW: Have you ever tried it in courts?

MR. TILLSON: We have no courts in Brooklyn.

MR. BARLOW: We have plenty of them here.

MR. RUST: We hear a great deal of experiments that have been made in California, but I do not think that the same rules can apply

to a country like that, as compared with the conditions we have in this part of the world.

We tried some oil upon one of our streets, and the result was that while it laid the dust effectually it was tracked into the houses. It so happened that it was laid just outside of the city hall, and for several days the smell of the oil was all over the building. It was also tracked into the different stores, and all over the carpets in houses, and finally we had to give it up.

I agree with Mr. Tillson when he says that it is not advisable to use it in city streets.

MR. HOWARD: I have had occasion to examine about eighty miles of those oil roads for some clients in Southern France, who were tired of their country roads. After studying the matter carefully I came to the conclusion that paraffine oils are unfit for oiling roads. The Texas oils and the California oils are suited for oiling certain classes of roads in the country and in suburban districts. It is not used in any place inside of a city in California so far as I know.

The use of oil is certainly a great blessing for laying the dust, there is not the slightest doubt about that, but the use of it in city streets is impracticable.

The difficulty, apart from the tracking, is that it will form an emulsion when it gets wet, and will get on the clothes and is very difficult to get off.

It was tried in Jersey, the Pennsylvania oil being used. It was not too bad till a slight rain came and mixed with it, and then we had a kind of a brown emulsion, something similar to wet meal with grease in it. The result was that the experiment had to be abandoned.

This is the result of my observation and experience. I may see fit to change my ideas on the point at any time, but for the moment I do not think that there is any use discussing oil for roads inside cities.

The question of tar roads is, of course, a different one. I advised my clients to stay by their coal tar, which was put on hot

and penetrated a distance of about half an inch into the material of the road, and stays hard after it gets cold.

MR. REIMER: Some of the railroads, at least those who use stone ballasting, find that there is little trouble with dust, except at the street crossings, and there they seem to pick up a great deal of it.

One of the railroads running through our little city used oil on their crossings. It was very offensive to me personally, and I should judge that the people who lived in the neighborhood would find it so too. The reason of this is that it was constantly by them, and they would have to smell of it in their houses all the time.

I would like to know if that has been the experience elsewhere.

MR. POLLOCK: The problem is with petroleum, not with oil like liquid asphalt.

MR. EGGERS: Down in our city we have very few streets macadamized, and they are not satisfactory. We are trying the experiment of taking some of the old asphalt taken from some of the other streets and putting it over the surface of those macadam streets. We believe we will get a good result and at a cost of about twenty-five cents a square yard. We cook the old asphalt over and loosen up the surface of the street and pour on this liquid hot, then it is rolled over.

It is simply an experiment that we are carrying on to see if we cannot improve things, for, as I say, our macadam roads have proved very unsatisfactory. In the summer time the wind blows the material away, and when we get any kind of a severe storm it washes it away and we are always having trouble with them. I believe that if we kept those roads in good repair they would be the dearest roads we have in the city. I think that macadam is the most expensive roadway that you can have, if you want to keep it in good repair.

MR. BARROW: We made an experiment something on the same lines as Mr. Eggers, on an old tar macadam road, that was out of repair and we had to resurface it. We used old asphalt on it, at a cost of about forty-five cents a square yard.

MR. KENDRICK: Several years ago we tried sprinkling with crude oil, and it was a failure.

This spring we constructed a block of pavement on about a five per cent grade, in the ordinary way, except that we did not put the screenings on top, but instead we scattered about an inch of asphalt and then we applied about an inch of screenings. The pavement has been there for six months and it has a very nice appearance. We are waiting to see what the result of the experiment will be.

THE PRESIDENT: Have they not had other experiences in the South?

MR. EGGERS: What does that work cost?

MR. KENDRICKS About twenty cents per square yard additional.

MR. RANKINE: As a matter of information I might say that in the report of the Department of Agriculture for 1903 there is quite a lengthy discussion of this question of oil on roads, and anyone interested in the matter would perhaps do well to consult the report of the department.

MR. EGGERS: Would it be in order now for me to ask a question? I would like to know what the opinion of the members present is with regard to "Bitulithic" pavement. I know that there are many gentlemen present who have tried it, and I would like to know what their experience has been?

THE PRESIDENT: No doubt that is a very interesting subject, Mr. Eggers, but still it is a little outside of the paper under discussion, and I am afraid that I will have to declare it out of order, as going a little too far afield.

I do not wish to shut out any discussion, but I am sure you will agree with me that if we allowed subjects to be discussed which are not brought up by the paper that there would not be any end to it, and we would never get through our program.

MR. HAZLEHURST: I have devoted some time to the study of oiling the country roads in our county, and perhaps it would interest the meeting to know what we have been able to do.

We are particularly unfortunate in lacking good material. We have no stone in our county at all. The soil is very loamy and sandy, so that the construction of even a fairly good road is almost impossible, unless we use the only available material, which is shells. We use oyster shells on our roads, as a rule, and it makes a fairly good road, of course, apart from its blowing away with the wind and being washed away by the heavy rains.

I have given a good deal of attention to the use of the Beaumont oil, which is an asphaltic oil, and is produced in Texas. After looking into it very carefully I came to the conclusion that it was largely a question of atmospheric conditions. I did not come to this conclusion hastily by any means, but only after I had studied all the information that I could get from the Department of Agriculture and from California. When I speak of it being a question of atmospheric conditions I mean this—In California they have very little rain (some seasons they have none at all) while in our locality we have from fifty-five to sixty-five inches of rain during the year. I have not made any actual experiments on the ground, and so am not able to give you any personal experiences, apart from the fact that I came to the conclusion that it would be unwise to use oil on our ordinary roads, where there is as much rain as we have. I think our average rainfall for the year would be about sixty inches.

THE PRESIDENT: There is a paper by Mr. Stewart on "Gutters and Cross Walks for Macadam Pavements." I think this would be a good time to hear Mr. Stewart.

Mr. Stewart then read his paper as follows:

GUTTERS AND CROSS WALKS FOR MACADAM PAVEMENTS.

BY W. J. STEWART, ROCHESTER, N. Y.

Macadam pavements, as usually constructed in cities and towns, are built between curbs, and this form of construction calls for a gutter and crossings. Of course, in the country these adjuncts are not used, nor are they necessary.

On the "Model" street at the World's Fair in St. Louis some fine samples of pavement were shown without curb or gutter, the pavements being built to the turf on either side in a straight clean-cut line, a well kept lawn extending from this line to the walks.

Here was shown asphalt, bitulithic, brick and macadam, all so crowned and graded as to make a beautiful finish; but in cities and towns proper curb and gutter are necessary, and generally crossings, though in some cities the latter are omitted, as they tend to the disintegration of the pavement at these points where the more unyielding crossing causes the macadam to be cut away on either side.

Brooklyn has some miles of pavement constructed in this way, but generally it is considered desirable to have a suitable crossing at the intersecting streets, at least, and in Rochester they are so constructed, and also where the distance is great between the intersecting streets they are placed midway between such streets. Our practice has been in the past to construct the gutters and cross walks with stone on a sand foundation, and later with block stone on a concrete foundation, the stone running parallel with the curb. The crossings, with cut stone flags 18 inches wide, the joints cut on the diagonal, three courses of flagstone placed 6 inches apart, a course of flagstone filling this space and 3 feet of paving on either side of the flagging, making the crossing 11½ feet wide. This stone construction, while very satisfactory, is also very expensive, but when well grouted the gutters are smooth and stable.

A more recent construction that seems to combine all the good qualiites of the stone, while being much cheaper, is of brick, preferably the block form, on from 4 to 6 inches of concrete and thoroughly grouted with Portland cement grout mixed in the proportions of one to one.

These gutters are 3 feet in width generally, though the width will vary 2 or 3 inches, depending on the kind of brick used, the crossings being 11 feet in width.

At first the brick were placed in parallel courses with the curb, but this made a straight joint with the macadam, allowing the traffic to cut a rut along the joint and the wheels to travel along the length of this rut, tending to wear the edges and also to displace the brick in places.

Another plan was tried by placing the brick at an angle with the curb, and in order to break joints properly, the cutting of a brick in every other course. This mode of construction made a kind of tooth edge where jointing the macadam, with considerably less tendency to cut away at the joining of the two. In this way the brick wear better than when placed parallel or at right angles to the curb. This will be found to be the case in a more marked degree where the street is entirely paved with brick. The traffic will be smoother and the brick wear longer. Placing the brick gutter at right angles to the curb also requires the cutting of every other course, in order to break joints.

In any mode of construction it is always desirable to have the concrete foundation project a few inches beyond the brickwork for better support to the brick, which are liable to be pressed below grade at the outer edge by the steam roller.

A more recent construction, and one that has proved the most satisfactory of any, has been the herring bone fashion that combines all the

advantages, with none of the defects, of the other plans. One of the greatest advantages is that no cutting of the brick is necessary, and the outer edge is left toothed, allowing the macadam to be pressed into the toothing by the roller, thus making a better joint between the brick and macadam, and the slightly extra work of laying in this fashion is more than offset by the fact that no cutting of the brick is required, while the joints are properly broken without effort on the part of the bricklayers, and in a uniform manner. The appearance is decidedly better.

Crossings can also be laid in this manner with decided advantage, as they are more securely bound together, and when properly grouted and traffic kept off for two weeks afterward, for a proper setting of the grout, will present a surface as true as asphalt, and depressions will never be found for the retention of water.

It is true that a well made and well kept macadam pavement generally presents a good crossing at any point, but as they are not generally well kept, and depressions retaining water are apt to be frequent in a well traveled street, the crossings are a decided advantage to pedestrians, if not to the roadway and vehicles.

THE PRESIDENT: This paper is now open for discussion. I agree with Mr. Pollock when he says that while this is a seemingly small matter, still it is really a very important one.

MR. REIMER: I have pretty nearly fifty miles of Telford macadam roads to take care of, and this question of crossings is a very interesting one to me.

Our people insist on having crossing at street intersections, and when I heard that this paper was to be presented to this meeting I was in hopes that something would be brought out which would show us how we are going to keep the roads up, or the crossings down, so that we would have an even roadway all the time.

With our fifty miles of road we find that we cannot do it—we have not discovered the way yet, unless we change the system altogether. The crossings make a nice smooth surface for the wheels, but as soon as they strike the macadam we find that they invariably grind a little bit off the edge. It is only a little at a time, it is true, but it continues, and after a short while we find that we have a slight hollow on each side of our cross walks. This hollow rapidly increases once it gets started. I hope that the discussion of this paper will bring out some means of remedying this condition.

MR. SHERRERD: I would like to ask Mr. Stewart a question. He spoke of using the herring bone form without cutting the bricks. I just wanted to know whether he would fill in the space entirely with cement?

MR. STEWART: Yes.

MR. SHERRERD: Without cutting the brick?

MR. STEWART: Yes. It is not necessary to cut the brick.

MR. SHERRERD: If you do not it leaves quite a hole?

MR. POLLOCK: I do not see the object of cutting the brick myself, in order to lay it diagonally. You would get the same serrated edge against the curb as you get along the gutter.

MR. STEWART: You get less lap all the time.

MR. POLLOCK: It seems to me that you would have the same lap at each joint. You get an angle equal to the thickness of the brick. You get a breakage of the joint.

MR. STEWART: But you get a small lap, not enough to make any difference.

MR. POLLOCK: And you would have the same lap that you would have at the edge, if you were to cut the brick.

MR. STEWART: I don't think so.

MR. POLLOCK: I understand that you simply get a little triangle equal to the thickness of the brick.

MR. TILLSON: I might say that for the last two or three years our practice has been wherever we curbed or guttered a street without pavement, or where we have laid macadam to set the curb in concrete, and put either a two or three foot gutter of vitrified brick, set in concrete, the joints being filled with cement grouting. We lay the brick parallel to the curb.

None of our macadam streets have any traffic to amount to much. They are in the residential portion of the city, and up to the present time the brick has been perfectly satisfactory.

I can plainly see, however, that in streets where there is much traffic, as in some of the streets of this city, where they use macadam,

there might be some danger if you have the courses parallel to the street, so as to have a longitudinal joint, but I do not think that the plan of laying the bricks diagonally would do much good, because the joints are so small. I feel confident that the practice that we are using is about as satisfactory a method as can be adopted.

A MEMBER: I would like to ask our Secretary whether he considers concrete as good a material as brick for such work?

MR. TILLSON: We do not. We have one street in particular (and I happen to live on it) which was paved with macadam about eight years ago, and the gutters were made of concrete. I know that the job was well done. The sidewalks and the gutters and the curbs were all laid at the same time, and we have found that the concrete gutters have worn away a great deal. It is a fact that concrete gutters will wear very fast, and the result of our experience is that we will not lay any more of them, except on one or two streets where there has been some concrete already laid.

I do not believe that it is good practice to lay concrete gutters, especially on macadam. If by any chance the edges of the gutter get above the macadam, say half an inch or so, then the edge gets the wear. In any event they are not satisfactory, so far as our experience has shown us.

MR. KENDRICK: I may say, Mr. President, that in our city we have abandoned those cross walks in the residential districts. We have a great many macadam streets, and instead of the cross walk, we raise the ground slightly at the intersection of those streets, starting back about sixty feet or so.

As Mr. Hazelhurst has told you, we have very heavy rains, sometimes as much as sixty inches in a year, and we lay concrete gutters about three feet wide. This concrete we make of furnace slag. We use furnace slag for almost everything down there, because we get it for practically nothing. The concrete that we use is made of one part of cement, three parts of sand and six parts of furnace slag. We put this on six inches thick, and dish the gutters as we make them. We then spread some of this mortar over the concrete

and broom it in, and divide the whole thing into nets six feet long. It is separated with a piece of tar paper every six feet, and during the five years that we have been using it we have had practically no trouble.

Of course, I admit that it would wear out on the streets where there is heavy traffic, but where we have it it has given good satisfaction. It costs us about sixty cents a square yard.

MR. BARLOW: We laid a part of Sherbrooke street, about ten years ago, with concrete macadam and a scoria block gutter about three feet wide, and we found the result very satisfactory for about five years . After that the concrete commenced to wear, and the edges of the blocks stuck up and were worn off. Otherwise it is still a very good street.

MR. RUST: In Toronto our experience has been somewhat similar to Mr. Tillson's. We laid bricks parallel to the curb, and have had no trouble with them. Of course I am now speaking of the bricks that were laid on macadam roads in the residential district.

THE PRESIDENT: I see that the members take a great deal of interest in what was called a seemingly unimportant subject. Personally I think it is about as valuable as any of the subjects we are likely to have brought before us for discussion, and I am pleased to see that the discussion has been so free and open.

If there are not any more remarks on this paper we will pass on to the next item, which is a paper on "Paving Materials; the Importance of Preliminary Tests," by Mr. J. W. Howard of New York.

Mr. Howard presented the following paper:

PAVEMENTS AND PAVING MATERIALS; THE IMPORTANCE OF PRELIMINARY TESTS.

BY J. W. HOWARD, CONSULTING ENGINEER ON PAVEMENTS, NEW YORK CITY.

The better the education, information and experience of an engineer or constructor, the better he is able to build for present and future needs. Paving is a brand of engineering which, like water works and other branches, demands a knowledge of the past from study, reading, cor-

respondence, examination and experience, to enable the engineer to provide specifications, tests and inspections, and thus produce pavements for present needs and which with minimum repairs can be used by succeeding generations.

As to cost, a city has so long a life that cheap maintenance, not cheap first cost, is true economy.

The problem of what is the best pavement is a local problem for each city and for each street. It depends upon the character, traffic, grade and other elements in each case. There are streets and avenues in almost every city adapted to either gravel, macadam, Telford macadam, asphalt, bitulithic, brick, stone blocks or other pavement. Local conditions and available materials must be considered.

It is the duty and privilege of every city engineer, official or other person, who has to do with street paving, to use the recorded, valuable and accessible experience in many cities in Europe and America, in laying and maintaining pavements. They should use, or cause to be used, the well established preliminary chemical and especially physical tests of paving materials, based upon practical and concurrent experience with past pavements of all kinds. We thus avoid past failures and repeat former successes.

Pavements of many kinds have been so long in use that the accumulated experience is very great. We must read, or possibly travel a little, to obtain it. No person, whether city employe or contractor, should experiment at the expense of a city. The long experience of the world with the following pavements is of interest. Scientific principles, definite tests and methods of construction have been deduced.

The pavements of the principal streets of ancient Rome and her leading colonial cities, although with worn surfaces, were a visible evidence to me, when I inspected some of them, that a solid foundation is a first requirement.

The French engineers, about 1770, provided a well drained sub-soil and demonstrated that a water-free bed is esential to lasting success for pavement foundation. It then withstands settlement from water and disturbance from freezing. It is thus possible to use thinner and cheaper foundations.

The Scotch engineer, MacAdam, established his system about the beginning of the last century, and made road surfaces of crushed stone, which, when properly selected and compacted, would bind together. All civilized nations soon adopted his methods. The French established definite methods of preliminary testing crushed stone for proposed use in macadam. Other governments, including ours, are following.

The English engineer, Telford, about a century ago, improved on MacAdams' method, by introducing under the crushed stone a foundation of large stone. This acts as a combined drain and a foundation for the macadam surface.

The study and administration of paving is being placed more in the hands of engineers and, like other structures, with more economic

and better results. The last 112 years has seen the development of stone block pavements, until we have the modern, uniform and well cut granite or equivalent block pavement with joints closed with waterproof filler, all on a solid concrete or equivalent foundation. Too many granite and other stone block pavements do not even approximate the model work found in Washington, D. C., and a very few other cities of the United States and Europe. This is largely due to the lack of knowledge of the best kinds of stone block pavements and how to secure them by preliminary tests and requirements.

Asphalt pavement was successful in 1854, on Begere St., Paris, France. It steadily spread to London and important European cities, where it is still maintained in constant good order, on the principle that "a stich in time saves nine." The celebrated French engineer, Leon Malo, who paved the street mentioned, is the father of asphalt pavements. It has been my privilege to be his guest in France and see his methods of testing and using asphalt paving materials. The asphalt pavements of Europe, with a very few late exceptions, are natural bituminous limestone. It was in 1871, in Newark, N. J., and finally in 1876 in Washington, D. C., that the American artificial, asphalt mixture pavements took their start, being composed of about 90 per cent of sand, etc., cemented together with about 10 per cent of asphalt-cement, (asphaltum and bituminous flux). These artificial mixture pavements depend for success, possibly more than any other kind of pavement, upon extensive preliminary chemical and physical tests of their component materials, combined with experience. Tests of asphalt, sand and other parts of asphalt pavement mixtures, full technical specifications and inspection of construction, are more necessary than ever, because there are now many good competing asphalts. These tests must not be made nor indicated, as is too often the case, by any man in the regular employ or controlled by any one asphalt interest. The tendency is to use purer and better asphalts, especially those not seriously affected by water. I have had occasion during the past two years to examine sixteen good asphalts, from as many independent sources. Some of the principal tests of asphalts and bituminous composition pavements are as follows: The asphaltum, flux, asphalt-cement, bitumen, etc., for purity, nature and quality, cementing power, ductility, flow, penetration, stability by evaporation or distillation, etc. The sand and other substances present or proposed for the mixture must also be carefully tested, all by standard laboratory tests, based upon experience with testing the materials, composition, etc., while laying or examining past and especially sucessful asphalt pavements.

Wood pavements, used under constant conditions of moist climate, uniform traffic and constant repairs, have been in use in London for more than forty years. Of course many of the wood blocks are often replaced, and all of them every three to seven years. Wood pavements, as a whole, especially in our wet and then dry American climate, have been failures. Nevertheless, there are a few streets of a few cities where

wood pavement, properly laid and maintained, will be a luxury worth its cost. It is wise to know the history and necessary to use the preliminary tests of wood paving materials and to have full specifications, to insure even approximate good results.

The rise of brick pavements began by small experiments, between 1870 and 1885. Their increase during the past fifteen years has been large. They are used a little in Holland and England. There are now about 168 makers of paving bricks in the United States. They produce many sizes and many qualities. Most of them are suited to only the lightest traffic. A score of makes of shale and a half dozen fire clay bricks will sustain medium traffic. There are a few good shale bricks, however, which will bear fairly heavy traffic and which are suited to some streets in many cities.

Brick pavements are a class which demands strict preliminary tests to secure sure results. Brand will not do it. Even a brand varies at times. The principal tests are abrasion, cross breaking, water absorption, density, hardness, crushing, also tests for free lime, potash, etc., presence of cracks, uniformity of shape, material, etc. Paving bricks which pass definite standards and methods of tests will make good pavements for certain streets in many cities. I have lately tested forty-two makes, and several passed safe the requirements.

Another class of pavement is what is called tar-macadam. It is being experimented with in a few English towns and in some Canadian and United States cities with light traffic. No definite mixture of tar nor quality of tar and stone or gravel are used. Each place or company is trying its own mixture, sometimes calling it tar, bituminous, or even asphalt macadam, for various proper local or for commercial motives.

A special pavement, called bitulithic, made of selected and prepared tar products or bituminous cement combined with graded, crushed stone, etc., began its rapid rise five years ago, being the result of examination of past experience, laboratory research and experiments. The theory and practice of bitulithic pavement is one of dependance for its good results upon preliminary tests of materials and predetermination of mixtures, combined with rigid inspection of work in progress.

Without discussing granite and other pavements, not enumerated, sufficient has been said to indicate the importance of using standard, scientific, chemical and physical tests, and examination of all paving materials previous to and during their use in pavements. The custom of certain cities relying on pavement guarantees and bondsmen is a bad one. No such method is in European cities, nor is it used for public buildings, bridges, water works, etc., in the United States. A street needs a good pavement, not a good bond alone.

A pavement laboratory, combined with good specifications and inspection, not only insures good results, but saves a city vastly more than the annual cost of its laboratory. While my testing plant and laboratory is at the disposal of all who send paving materials, it is a greater pleasure

to freely help cities prepare specifications, state the tests and establish their own testing laboratories to their permanent advantage.

MR. EGGERS: Would it be in order to ask now the question which I put a few minutes ago?

I want to ask this now, not only of Mr. Howard, but of the gentlemen who represent the different states and cities.

About a year and a half ago we laid four streets with bitulithic pavement. I, as one of the commissioners, advocated very strongly that we should get a sample of it in our city, as we spend three or four or five hundred thousand dollars every year for pavements. We were all very much interested in getting a noiseless pavement.

Well, the four streets were laid, and so far those four streets have proved satisfactory to me, and I believe to the other commissioners. The company then tried to get a lot of other streets to pave, which I did not approve of, and which the other members of the commission did not approve of, because we are elected directly by the people, and are held responsible by the city, and it is therefore very essential for us to know what we are doing, and we are very anxious to learn whether this pavement will last.

So far the pavement is wearing pretty well. We have no complaint that it does not wear. It is noiseless, and is not very dusty. It is merely a question of how long it will last.

It cost us two dollars and twenty-five cents a square yard, but we have no kick on that. As you all know, it is a patent pavement, and I might tell you that the majority of the property owners on the street have given their consent and want the pavement.

Of course you cannot always go by that, because I found out that they did not always use an honest way of getting those subscribers. The asphalt companies do the same thing. They go and see the people and get their consent, and then come to the board and say that the people want that pavement. I never thought that a fair way of doing it, but I am not an enemy of that pavement by any means.

In regard to the bitulithic, I want to know just how it is going to last, and what satisfaction it is giving before I vote to lay another yard of it. I want to know if it will wear.

I would like to have the benefit of the experience of the gentlemen present, because I believe that the pavement has been laid in different sections of our country, and in Canada, during the past five or six years, and I would be very much interested in learning what the result of the experiment has been.

MR. CARPENTER: As representing the City of Pawtucket, in the little State of Rhode Island, I feel called upon to answer Mr. Egger's question, for the reason that the first piece of bitulithic pavement ever laid in the United States, or, in fact, ever laid anywhere in the world, was laid in the city from which I hail. I also want to say here and now, as was suggested in the question, that it was not laid because the abbuttors asked to have it done, but because the officials of Pawtucket wanted to have it. They were looking for what appeared to them to be a good thing. They had in the past experimented with coal tar—experimenting in a crude sort of way, by turning it into crushed stone hills, to prevent the washing out by rains and the kicking up by horses feet, and they had met with considerable success. It was an improvement in the binding of the stone together.

So, after noticing the bitulithic pavement, we searched for the people who were making it, and then tried to find out what it was, and that was the way the first piece of bitulithic pavement came to be laid.

That piece of pavement is now entering upon its fifth year. Some of it was placed on a 12 per cent grade, other pieces upon a 4 per cent grade, and others on a 7 per cent grade. The street is narrow, only 33 feet in width, and 21 feet between the curbs.

This piece of pavement is proving entirely satisfactory, and today I cannot see that it is any different from the day it was put down.

We also laid another piece nearer to the center of the city, on a 40 foot street, 24 feet between the curbs, and of a finer surface than that on the heavy grade. We did this purposely. That street appears to-day to be in as good condition as when it was first laid.

A year ago last summer we also laid two long streets—upwards of thirteen thousand yards in each place—and on streets in which

there was a trolley line. One of the streets is 40 feet in width, with the ordinary 8 foot sidewalks, 24 feet between the curb stones, and the standard trolley line in the center.

All that whole street paving is smooth. The teams, of course, will not travel in the center of the road, the part occupied by the tracks, but will take to either side, and that pavement is wearing well and is in good condition to-day.

As far as my observation has extended the wearing features of the bitulithic pavement appeal to me as being very satisfactory, and I have seen the pavement in a number of cities outside of my own.

By the way, I ought to have told you that the pavement I was speaking of, in Pawtucket, has had no repairs, and it is not in need of any now.

In one instance it became necessary to cut an opening in the street to fix a water main. A square hole was cut in the pavement and the piece was taken out in one block, and after that the excavation made and the pipe caulked. When the hole was filled the piece of pavement was put back in its place, and it is there to-day in as good shape as the rest of the pavement, with only the mark of the cutting around the square. There is no depression, no elevation, and there has been no working away of the edges, because of the cut.

Another thing that appeals to me as being of some consequence, and to show something of the nature of the pavement, is this: There appears to be no necessity of putting a heading course where the bitulithic ends and the macadam begins. It has not been done with us, and there has not been any breaking away.

I rise to offer those few remarks simply for the reason that Mr. Eggers has asked for the experience of those present, and for information regarding cities which have used the bitulithic, and inasmuch as I represent the city which has happened to have the longest experience with this particular pavement, and also, as somebody has been kind enough to say, that "Pawtucket, Rhode Island, is the mecca of all enterprising engineers."

MR. KENDRICK: We began laying this bitulithic pavement about two years ago, and we have so far constructed about a hundred thousand square yards of it, and have about fifty thousand under contract.

Before laying the pavement we examined it in Nashville, Tenn., and many other places. In Nashville it has been down nearly four years, and so far as I have been able to see it looks better now than it did when it was laid down.

We began in the center of our city and laid the pavement on the streets with double trolley lines, and we have noticed just this one trouble with it, and it is the same as you would experience with asphalt, there is some little trouble along the rails. We have recently adopted the plan of laying vitrified brick between the rails and for 18 inches outside of them, and the rest of the street is paved with bitulithic. The grades of our streets are from practically level to about 7 per cent.

We have three classes of this pavement, one which we lay upon old macadam streets, and for this we pay a dollar and sixty-five cents a square yard, with a ten year guarantee. We have another class which we lay upon concrete foundations—six inches of concrete—and we have a third class that we lay upon six inches of broken stone. We pay a dollar and ninety cents a square yard for either of the two latter, both with a ten year guarantee.

We use furnace slag for the first six inches, and put two inches of broken stone on that. The result has been that we have had no complaints at all on the 7 per cent grade from the horses slipping or anything of the kind, and everything seems to be lovely.

MR. RUST: Up to the present time the Warren people have laid about fifty thousand yards of their bitulithic pavement in Toronto. I think the first piece was laid about three years ago, and it is still in excellent condition, and the residents upon the different streets where it has been laid appear to be very well satisfied. It is not as slippery as asphalt, nor as noisy.

We have one street laid with this pavement where there is a trolley line, but that was only laid last year.

The prices that we have been paying are about two dollars and twenty-five cents a square yard, with a ten year guarantee.

MR. EGGERS: We have one street where there is a double trolley line, and the trolley company has laid granite blocks inside of their rails, and along outside. It seems that the pavement wears very well, so far as we have been able to see. It does not break up like asphalt, or like the bitulithic would if there was no stone along the tracks.

MR. RUST: I probably should have mentioned that we have laid granite blocks along the rails.

I would like to ask Mr. Kendrick the manner of construction where the pavement was not so successful close to the rail. Were they heavy rails or light ones?

MR. KENDRICK: Nine inch girder rails—grooved rails.

MR. RUST: Laid on concrete?.

MR. KENDRICK: Yes. This furnace slag that I spoke about is not worth much. It is free for the cartage, and we have all we want of it. It has another advantage, in a certain sense, and that is that it does not require crushing. It comes out just the right size.

I would like to mention that in laying out underground heating system we have had to take up blocks of it, and when they are put back it takes a very close observation to find out where the patches were put in. It is true that it is very difficult to take up, and we had to use iron tools to cut it right through. It is harder to take up than concrete.

MR. RUST: May I ask Major Howard if I am to understand that brick makes a poor pavement?

MAJOR HOWARD: While some are excellent, as a general class it is not a good pavement, especially if we consider the many makes of poor paving brick. Of about 168 makes, I have examined in past years, only about forty are worth considering for paving purposes. About a dozen of these makes when properly laid on a concrete foundation with the joints of the bricks crowded, with

suitable grout with provision for longitudinal and transverse expansion joints, it is possible to produce excellent brick pavements for special streets in almost every city, especially where there is no objection to the noise of traffic. Any bricks which will pass the severe standard tests, which I apply in my power testing plant for paving materials, including brick, will be reliable for brick pavements. Among tests made of a large number of bricks several showed high tests. I can mention one, not by name, for that would not be proper. It showed the following record. Size, including projections or lugs on its side, 8.63x3.57x4 inches, weight, 9.6 lbs.; corners rounded; brick side cut, then repressed; shape uniform; material high grade shale; color chocolate red; interior mass homogeneous; no cracks nor voids; annealed or fused to toughness without excessive brittleness. The standard rattler and other tests gave the following averages, with slight variations of maximum or minimum of the twenty-one samples of this make tested: Abrasion, 9.7%, cross break modulus 3,581 lbs. per sq. inch; absorption of water 1.45% of dried weight, density compared with water 2.37; hardness compared with diamond 70%; crushing 9,823 lbs. per sq. inch. Chemical analysis showed no free lime, potash, soda. There are a few makes of bricks which approximate closely the above. They are found among shale, but not among fire clay paving brick, which is more friable, brittle and porous than the best makes of shale brick, due to the inherent natures of shale and fire clay.

THE PRESIDENT: The next item on our program is the reports of the committees. In the first place we will hear the report of the Nominating Committee, if they are prepared to present their report. Mr. Sherrerd was appointed chairman of this committee, I think.

MR. SHERRERD: We are not prepared to present our report yet. We desire to have an officer who will be from the place where we hold our next meeting, and perhaps the Committee on the Place of Next Meeting would present their report first, and then we will be prepared to present ours, as soon as we know where the meeting is to be held.

THE PRESIDENT: I understand that the Committee on the Place of Meeting are not prepared to present any report as yet. In the meantime I think we might proceed with the reading of the papers we have.

The next paper on our program is by Mr. B. E. Briggs, city engineer, Erie, Pa., on "The Cost of Collection and Disposal of Garbage." Mr. Briggs is not here at the moment to read it personally, but I would ask our Secretary to read it for him.

Mr. Briggs' paper was as follows:

COST OF COLLECTION AND DISPOSAL OF GARBAGE.

BY B. E. BRIGGS, CITY ENGINEER, ERIE, PA.

We find that it has been the practice of the Committee on Garbage Disposal to make the introduction of their report in the form of an apology, and as human nature is prone to follow beaten paths, we will fall in line with the statement that this important work has been placed in wholly incompetent hands—that is, so far as the chairman is concerned—without experience or knowledge sufficient for a working basis.

Letters of inquiry were mailed to a large number of cities, with a view to gathering data for this report, but comparatively few replies were received. It seems that the practice of collecting information and expert opinions by means of "circular letters" has grown to such an extent that "we have been questioned to death," as one party expressed himself in his reply to our inquiry.

However, a number of queries fell into the hands of a very accommodating and courteous officials, who furnished us with some valuable data from which we make the following deductions, in which we have not considered the cost of plants, maintenance, nor interest on the investment where the city owns the property:

In several cities, such as Terre Haute, Ind., and Salt Lake City, Utah, of from 40,000 to 60,000 population, the garbage is collected and cremated by city employes. In the former city they collect, haul three miles and burn about 3,170 tons of garbage and refuse annually, at $1.86 per ton, amounting to $6,000, or 158 pounds per capita, for 15 cents per annum; and in the latter city the haul is two miles, for 3,720 tons of garbage, at $2.60 per ton, $9,672 total, or 133 pounds per capita for 17 cents.

Atlantic City, with its varying population, which is estimated at 40,000 in winter and 300,000 in summer, and Buffalo with its 360,000 of population, each contract with private concerns to collect and dispose of their garbage. Atlantic City's contract is divided so that they pay annually $19,500, or 50 cents per ton for collection, with an average haul of one and one half miles, and $24,800, or about 64 cents per ton for

disposal, making a total of $1.14 for both collection and disposal. Buffalo pays $2.19 per ton, with a haul of three miles, for 31,000 tons, which is equivalent to 172 pounds per capita for 19 cents per annum.

In Milwaukee the employes of the health department collect about 36,000 tons of "kitchen offal" annually, at a cost of $67,082, or $1.86 per ton. Transportation to the destruction plant on an island and the cost of operating the plant amounts to $50,286, or $1.40 per ton, making a total of $3.26 per ton, and an annual sum of $117,368, or 248 pounds per capita, for 40 cents.

Chicago also collects her garbage, which includes "stove sweepings" paper, etc., and carts it an average distance of three and one-half miles to the outskirts of the city, where it is disposed of by dumping into "clay holes." It amounts to about 775,000 tons annually, of all classes of refuse, at 86 cents per ton, making a total of $666,500, or 912 pounds per capita, for 39 cents.

The only information concerning a revenue derived from garbage came from the New England cities, of which we mention Lowell, Mass., with a population of 100,000, where the board of health controls a force of men and teams that belong to the city, that collect garbage under the head of swill, ashes, paper, and market and hospital refuse. The annual report of the board for the year 1904 shows that it cost, aside from maintenance, which was small, for collecting ashes or rubbish, $10,715; for swill and refuse, $8,325, and for cremating the refuse, $993, or a total of $9,318. The same report shows that they sold swill to farmers to the amount of $5,555, leaving a net total expense for garbage of $3,763, or 4 cents per capita. The quantity of garbage cannot be given, as the report lists the amount as 4,352 loads of swill, 303 tons of refuse, numerous dead animals, etc.

It will be noticed that the Chicago rate is the lowest, although "stove sweepings" and papers are collected as garbage, which fact probably accounts for the large amount (912 pounds) per capita. As the garbage is not destroyed, that rate of 86 cents is for collection and cartage only, as against 50 cents in Atlantic City and $1.86 in Milwaukee for the same work, except the length of haul. A comparison of the total rate per ton in the cities mentioned above is as follows:

	Per Ton.		Per Annum.
Buffalo, by contract	$2.19	172 lbs. per capita for	19 cents
Atlantic City, by contract	1.14	172 lbs. per capita for	19 cents
Milwaukee, by city	3.26	248 lbs. per capita for	40 cents
St. Louis, by city	2.80	160 lbs. per capita for	23 cents
Salt Lake City, by city	2.60	133 lbs. per capita for	17 cents
Terre Haute, by city	1.86	158 lbs. per capita for	15 cents
Chicago, by city	.86	912 lbs. per capita for	39 cents

The few cities mentioned above were selected as an average of their class, from the data at hand, in order to give a condensed statement.

We found some interesting information in a statistical paper prepared by Messrs. Winslow and Hanson, on "Garbage Disposal," published in the Proceedings of the American Health Association for 1903. These gentlemen receive reports from 155 cities of over 25,000 population. We quote the following extracts from their paper:

"Out of 146 municipalities, 111 report more or less complete separation of waste materials, the garbage in particular being commonly kept distinct from ashes and combustible wastes. * * * With regard to ultimate disposal, almost all the cities report that ashes are dumped on land, or used for filling, while in a few cases they are dumped in whole or in part into the nearest body of water. * * * The larger communities might, however, study with advantage, the utilization plants for some time in operation in New York and Boston, where the dry refuse, other than ashes, is sorted over as it passes along a moving platform, so that paper, metal, and any other objects of value are recovered, and only the worthless is burned. * * * The methods in use for the disposal of garbage vary more widely, and their relative importance is indicated in the following:

"44 cities dump on land.
9 cities burn in dump.
14 cities dump in water.
18 cities plough in or use as fertilizer.
41 cities feed to live stock.
27 cities cremate.
19 cities reduce.
11 cities irregular disposal by private parties."

THE PRESIDENT: I think it would be as well for us to have all the papers on this subject read first, and then if there is any discussion they can all be taken en bloc and dealt with in that way.

With the consent of the members I will now call upon Mr. Howard G. Bayles of New York to read his paper on "The Incineration and Cremation of Municipal Waste."

Mr. Bayles then read the following paper, as requested:

INCINERATION AND CREMATION OF MUNICIPAL WASTE.

BY HOWARD G. BAYLES, CONSULTING ENGINEER, NEW YORK.

There are four steps in the advance of progress in municipal final disposition. These are,—first, to throw waste into private back yards, as far from the house as possible. As the population becomes more dense, the tendency is to throw all waste into what might be called "the back yard of the city," or its outlying and unimproved margins.

The third step is made when it becomes too expensive to haul all classes of waste far enough to prevent the putrescible parts of it from making a nuisance. Then comes separation, dumping the less objectionable waste, and the reduction or cremation of the garbage and offal, usually at heavy expense. The final step along the line of sanitary and economical final disposition is to burn all classes of waste.

This conclusion became fixed in my mind in studying New York's conditions and requirements. I turned to other cities for proof.

To discuss reduction at any length would be to waste your time. The only reduction works that I have recently visited were in Columbus, Ohio. This single example is enough.

The Columbus collection of garbage and dead animals in 1902 was 12,640 tons. The subsidy paid by the city for collection and treatment, under a ten-year contract, was $15,800, or $1.25 per ton. The company claims to have received that year from the sale of by-products about $30,000, or $2.37 per ton. They also say that their net loss was $5,000, or .40 cents per ton. The total of these figures would make the cost for collection and reduction a trifle over $4.00 per ton. Of this, probably $1.75 represents the cost of collection, as the cart haul is short, and the balance, or $2.25, the cost to the company of operating the plant and paying salaries. Aside from its expense, this plant is a nuisance of the most pronounced order. To multiply examples would be useless. Reduction has everywhere proved an expensive nuisance. That is why I ranked it with the cremation of pure garbage as the third step toward ideal final disposition.

The word "Cremation," by the way, I shall use as applying to the destruction by heat of pure animal and vegetable waste.

I shall speak of "Incineration," when I refer to the burning of mixed refuse.

Milwaukee owns and operates a brick garbage crematory, located on Jones Island, in Lake Michigan. The location very much increases the cost of collection, but was forced on the city by a public prejudice so strong that no other site was possible. Judging only from personal observation, I should say that the prejudice had been amply justified. The system of dumping all garbage first into large open drainage tanks from which it is shovelled by hand into the furnace, allows the odors to escape freely. Besides creating a great nuisance, this plant is extremely expensive to run. With a capacity of about 100 tons, from 65 to 85 men are employed in and about the crematory. The cost for operation and maintenance is about $1.87 per ton. Even at this high cost, the work is not thorough, and numerous complaints have been made to the board of health concerning the partly burned and still rotting material dumped with ashes on the lake shore.

Muncie, Indiana, has had for some years a crematory, burning natural gas. The fuel is so cheap, while it lasts, that expenses appear very low. As long as the gas was plentiful, the cost for labor and fuel, burning about 12 tons a day, was 67 cents a ton. The crematory was built by a

man who knew nothing of garbage cremation, but had worked in a steel mill. He therefore did what he knew, and built simply a Siemen's regenerating open-hearth furnace. It would be too costly with any other fuel, and the approaching exhaustion of the gas has made it necessary to find another form of furnace. The selection made by a delegation from the city council, after carefully inspecting a number of municipal plants, was the type of steel incinerator used in Minneapolis.

Hearing of the approaching test of the new incinerator at Muncie, I decided to be present, and was paid the compliment of being asked to keep the exact tally of weights, and make a report on the whole test run. The contract called for a furnace that should burn in 24 hours

24 tons of kitchen garbage,
12 tons of combustible refuse,
4 tons of night-soil,

at a cost for labor and fuel not to exceed 50 cents per ton.

At the end of the test there had been burned:

28 tons of garbage and dead animals,
9¼ tons of combustible refuse,
4 tons of night-soil.

The combustible refuse was of a very poor grade, containing a considerable quantity of manure, and the proportion actually burned was less than one-third the garbage, instead of one-half as agreed, thus burning a more difficult class of waste than was necessary.

The cost for labor and fuel properly chargeable to regular operation was $8.05, or about 20 cents per ton.

The most expensive furnace I have visited is on Staten Island, or, officially, the Borough of Richmond, New York City. Here the amount burned in 1904 was only 1900 tons, and the cost for fuel, labor and repairs was $2.88 per ton; 1903 was somewhat lower, only $2.44 a ton, but the first six months of 1905 show a cost of $3.47. The garbage burned in this crematory has a considerable admixture of paper and rubbish. The ash is from 25 to 30 per cent. of the weight of the material burned, which means incomplete cremation.

The Atlantic City crematory, which was wrecked by a storm some years ago, was of another of the brick types. At the time of my visit, exact figures as to its cost of operation were not available. My estimate, from such data as I could get, was that it cost $1.70 per ton through the year.

Mr. J. Fetherston, Deputy Commissioner of Street Cleaning for the Borough of Richmond, New York City, kept a careful record of a week's run one summer and found a cost of $1.48½ per ton.

In Bridgeport, Conn., the experience with a brick crematory was unsatisfactory, and a reversion has been made to what they consider an improved form of reduction.

The now abandoned crematory cost $15,000 to erect and about $500 a year to keep in repair. The expense for labor, fuel and repairs was $1.17

per ton. The fire-brick bars that form the grate of the middle chamber had to be replaced, a few at a time, about once in the year. This crematory belongs to a well known type, and merits a brief description.

There are three chambers, one above another. The top, or drying chamber, supports garbage on a brick arch which is heated from below. Material is delivered to the central chamber from time to time by raising the metal bells that cover the dumping holes and poking the garbage down by hand.

The central chamber supports garbage on fire-clay grate bars. Heat is supplied by a coal fire at one end, the gases from which pass over the garbage on their way to the stack. From this chamber garbage is again poked by hand to the lowest, which has a solid hearth. This chamber is also heated by a coal fire at one end, and forms both a secondary combustion chamber and the ash pit. A third coal fire is placed at the entrance to the stock, to consume any odors from drying garbage.

This crematory embodies three of the worst features of design possible in a garbage furnace.

(1) The floor of the top chamber is a fire-brick arch, intensely heated from below and irregularly cooled from above. No brick arch ever made can stand such treatment very long, and the engineer in charge must watch it carefully in order to rebuild it before it caves in.

(2) The fire-brick grate bars are special pieces and costly. Even with normally careful operation, they are frequently chilled from red heat to comparative coolness, and, in consequence, often break. They are, moreover, so situated as to be extremely vulnerable to the blows and disturbances of the heavy pokers which the firemen must use.

(3) The principle of the burning is wrong, as it is done from the top down, and the first material burned blankets what is unburned. To counteract this tendency, a large force of stokers is necessary, in order to keep the material constantly turned over.

In Trenton, N. J., there is another crematory of the same type as the one in Bridgeport, but somewhat different design. In this furnace there are only two chambers, the two upper ones described above being merged, and a grate of iron bars being substituted for those of fire-brick. The original cast iron grate bars lasted very badly, and were replaced by 80-pound rail sections. These seem to have lasted better.

As this was a private plant operated under contract with the city, and the contractor had died, no figures could be had as to its cost of operation. The only light on the subject is furnished by the fact that at the expiration of the contract the city was in doubt whether to buy the existing crematory or build an incinerator for mixed refuse of the type used in Lancaster, Pa.* This latter plant I have not visited, but I have the departmental reports for some years back, and at the time the choice in Trenton was made, the cost in Lancaster for incineration was $2.10 per ton. As this presumably

*N. B.—Since this paper was presented, I have learned that the Lancaster plant has also been abandoned.—H. G. B.

promised an economy, the Lancaster plant was decided on. That this economy has been more than realized in Trenton, seems apparent from the figures given me, which showed a cost for labor, fuel and repairs of only 50 cents a ton. What is not so apparent is why the same work can be done with the same furnace in Trenton at one-fourth the cost in Lancaster. This discrepancy would argue a misunderstanding somewhere.

The incinerators of Trenton and Lancaster are of a type quite different from any I have so far described.

The unit cell, of which Trenton has two, is about 6 feet wide, 5 feet high and 10 feet long. The bottom, which is about 3 feet above the floor level, is formed by an iron grating. Under the 4 feet nearest the front is an ash pit. Under the rear part is a shallow pan to catch excess moisture, which is later evaporated by the heat above. The sides and top are of brick arch construction, and at the time of my visit were much in need of repair, as the bricks were badly burned out. Refuse is put into the cell through a circular hopper in the top, opening from the upper or dumping floor, and closed by a heavy cast iron lid.

As the gases of combustion leave the cell, they pass over a coal-burning grate which acts as a fume consumer, then to the stack. In the stack is placed a grate to intercept any particles of paper carried out of the furnace. That this does not quickly clog the draught is a surprise to me.

The fire is started by using paper, wood and coal on the forward part of the grate which is over the ash pit. When this is burning strongly, the cell is filled with refuse. This is stirred and pulled about both through the top hopper and the front doors. Every two to four hours the firemen have to let the material in the cell burn out, and clean it completely. A new fire is then made. The presence of unburned pieces of melon rinds, corn cobs, potatoes and other less combustible waste in the ashes would seem to indicate that the combustion is not always complete.

Yonkers, N. Y., has a small incinerator, burning from ten to twenty-five tons per day, according to the season. The cost for labor, fuel and repairs through the year is about 61 cents per ton.

The furnace is of brick, divided into an upper and a lower chamber by a grate of cast iron bars. Each bar has three longitudinal webs, so that turning it over dumps refuse from the grate to the hearth. Two coal fires supply heat. Gases from the first fire pass over the material on the grate, join the gases from the second fire, which is at the other end of the furnace, and return below the grate to the stack.

In two of the cities I visited I found results so radically different from those usual in cities having brick furnaces that the accuracy of my figures has been several times questioned by those whose experience led them to consider that $1 a ton was a good figure, and 50 cents almost the unattainable ideal.

In Minneapolis, Minn., an all-steel incinerator was erected about four years ago, the first of its type, and its completion marked the beginning of a new era in municipal final disposition. Since it was built it has

never been idle a day for repairs, and less than $20 has been spent on keeping it in perfect order.

For the year 1904 the collections were 19,079 tons, or an average of 61.5 tons a day. The costs chargeable against the plant were $7,370. The cost of incineration per ton of mixed refuse was 38.6 cents.

Dr. P. M. Hall, the health commissioner, assured me that the cost would be materially lower for this year, probably about 31 cents, as suitable wood fuel had been arranged for at lower cost, and some unnecessary charges had been cut down by a change in the department. Dr. Hall said that they were so satisfied with this furnace that next year a similar plant will be erected at the opposite end of the city, to meet the needs of the growing population.

The Minneapolis incinerating plant consists of two fifty-ton furnaces, using a common stack. The furnace walls are of steel, having a 4 inch water circulating space, and stay-bolted for stiffness. The top, or crown, is a steam and water space 24 inches high, having an open circulation with the sides. From the front to the back wall, and a few inches below the crown, extends a 6 inch wrought iron header. The upper grate, which has an end view like an inverted V, is formed of 1½ inch extra heavy wrought iron pipes, placed about 10 inches between centers. These extend from the header to the lower part of each side wall, and form practically a water-tube boiler.

The lower grate is of cast iron, flat, and about 8 feet below the crown. The combustible refuse is dumped direct to the lower grate through a hopper outside the furnace, and opening into the front end below the upper grate. The upper grate receives garbage, offal and dead animals and the less readily combustible classes of waste. This wet stuff is held over the fire and dries out, and is gradually worked down to the lower grate with pokers. Auxiliary fuel is used on the lower grate, in the form of pine edgings and other light sawmill scrap, of which one to one and one-half cords per day are burned. A smoke and fume consumer was originally put in the lower part of the stack, but was removed, as it was found to be an unnecessary precaution.

Below the lower grate is an ash and evaporating pan. This catches and holds any excess moisture that drains from very wet garbage. The pan is of steel, with a double bottom, amply stay-bolted. As soon as the furnace gets up pressure, which happens soon after lighting, steam is turned into the false bottom of the pan, and any liquids that have drained into it are evaporated. The vapor is drawn by the draught through the lower grate, any odors it may carry being destroyed by the heat of the fire.

The gases of combustion from the lower grate have to pass through the material on the upper grate, drying and burning it, on their way to the stack. The vapor issuing from the stack is white and odorless. I am told that no complaints have been made of nuisance maintained by the plant.

Atlanta, Ga., stands at the top of the list for efficient and economical final disposition in this country, and, I believe, in the world. Their incinerator is of the same type as the Minneapolis plant, but it was built

three and one-half years later, and embodies the improvements dictated by experience. This plant has a capacity of 200 tons in twenty-four hours, and consists of two furnaces using a common stack. The furnace walls are of steel, lined with fire brick. As these sides are always protected by relatively cool garbage, there is no danger of the bricks burning out for many years. The crown is of steel plate 18 inches high and liberally stay-bolted. The upper grate bars are joined directly to the crown and connect it with the headers that extend along the lower part of each side of the furnace. The downward circulation of water is provided for by four 8 inch vertical wrought iron pipes, that extend from the corners of the crown to the floor, having T couplings with the headers. These vertical pipes also serve to keep the weight of the crown from the side walls.

There are seven hoppers, all opening from the upper floor, to receive different classes of waste. Four deliver direct to the upper grate. Into these mixed refuse and moderately dry garbage are dumped. One, at the front, delivers dry combustible rubbish direct to the lower grate. Two are built externally at the sides of the furnace, and in these very wet garbage is held and allowed to drain its moisture into the evaporating pan before delivering the solid material to the upper grate. The dumping is straight from the carts into the hoppers, and there is no handling of waste. The fire is hottest on the lower grate, where dry material is constantly burning. The gases of combustion pass through the material on the upper grate, and through a combustion chamber filled with brick checker work. They then pass through two horizontal brick lined flues about 8 feet long and are deflected downward from a height of about 10 feet to nearly the floor level. Here the gases strike the surface of a water tank, placed there to detain any particles of solid matter carried out of the furnace. They then pass between two coal fires which act as fume consumers. The gases then pass over one baffle wall and under a second, again getting a downward velocity and striking a second water tank. In the lower edge of the last baffle wall is a pipe which projects a spray of steam downward. This steam carries into the water tank any solid particles not previously caught. The gases then enter the stack, which is 200 feet high and 7 feet inside diameter.

The material burned is mixed refuse, that is, kitchen garbage, rubbish, boxes, barrels, and occasionally a little manure. The bulk of the manure, the night soil, the street sweepings and ashes are not burned, but are carted out of the city.

Up to the first of July no fuel other than the coal in the fume cremator was used, the waste material furnishing all the heat necessary for its own combustion. During July it was found necessary to use cordwood on the lower grate, about two and one-half cords per day. This condition, which extended decreasingly through August, was due to the melon season.

During the months that no fuel was necessary in the furnace the cost of operation was about 14 cents per ton of refuse consumed. During July

it was 30 cents, and for August it was not expected to average over 20 cents. This would make the average for the year only 16 cents per ton. The repair item is negligible. The only thing about the plant that has so far needed attention has been the concrete floor that is immediately over the furnace. There seems to be no other part of the furnace that could wear out or give way, owing to the care taken in adapting every part to its function.

Atlanta expects to duplicate this incinerator in another part of the city within a year.

But before the erection of this plant several brick crematories were tried without success. Two burned up and caved in and were not rebuilt. A third was run for a time and abandoned. The first two were designed and erected by a local company. The third was of the same type as those abandoned in Bridgeport and Trenton. I could not get accurate data as to their costs of operation, but they were evidently unsatisfactory.

A comparison of the record of the present Atlanta incinerator with those of the plants abroad would seem of interest. We must not allow ourselves, however, to be deceived by simply changing shillings and pence to American money. We must take into account the relative cost of labor if we would see how English incineration practice compares with our best attainments. Even with this correction, it is impossible to say that we have the figure for which a particular furnace would do Atlanta's work. The English use much less fruit than the Americans, and are less extravagant and wasteful. Their mixed refuse has a lower proportion of vegetable waste, and is therefore dryer. There is no house separation, and ashes carrying about 30% of good coal are collected with the refuse. This mixture of ashes should make the waste easier to burn and less likely to pack in the furnace. Assuming, however, that the refuse has the same composition, we can reduce the cost of labor to our standards and get an approximate idea as to relative efficiencies. Charges and stokers worth in this country $1.50 a day are paid in England about two-thirds as much. The average of thirty-five installations of the top, hand fed type, gives, on our basis, 41 cents per ton for labor. Nine direct charging plants show a labor cost of 44 cents a ton. Twelve plants in and about London cost an average of 48 cents per ton, and range from 23 to 82 cents. For none of the English brick destructors have I any data as to the repair costs. The best of the English plants of which I have record is not as cheap, at our labor scale, as the Atlanta incinerator.

Advocates of the English systems of destruction will reply that this difference in labor cost is more than compensated by the value of the power produced and utilized. I grant without discussion that England leads us in the application of power from refuse destruction. That more steam is produced in English destructors than in incinerators of the type in Minneapolis and Atlanta, I doubt. During my visit to the Minneapolis plant steam was escaping copiously into the open air at 50 pounds gauge pressure, and at Atlanta the same was true at 30 pounds. It is an evi-

dence of poor municipal economy, rather than poor furnace construction, that this steam is not profitably utilized.

Of the furnaces in New York and Boston burning only combustible rubbish little need be said. A careful comparative calculation showed that the Forty-seventh street incinerator in New York is being operated at a cost to the city of $313 per week, or nearly $2 per ton, over and above the former cost of taking all rubbish to land fills. This makes allowance for all power utilized and the better picking facilities afforded by a belt conveyor.

In Boston the city pays by the year an amount equivalent to 50 cents a ton, and then disposes of the ashes. No utilization of power is made except for plant purposes.

The general practice of picking over refuse for the recovery of glass, rags, metal and paper is perhaps the most pernicious ever allowed. I venture to say that it costs the country more, owing to its dissemination of tuberculosis and other contagious diseases than it can possibly net the city in payment for picking privileges.

Complete incineration is the only ultimate solution of the final disposition problem, and the Atlanta type of incinerator has given the best results so far realized.

THE PRESIDENT: Those two papers are now open for discussion.

MR. RUST: Might I ask Mr. Bayles if he knows what was the cost of the Atlanta plant?

MR. BAYLES: I have not the first cost in detail, but I know that the plant was put in at a reasonably low cost—at least I was told this in Atlanta, because the company which put it in wanted to open up the southern field, and show what it could do. I believe they told the Atlanta officials after the first one was finished that they would not duplicate it for less than twice the amount they installed the first one for. One of the Atlanta officials told me that the Atlanta council intended to pay twice the cost of the first one to have another plant of the same kind, as soon as they could get their next year's appropriations through.

MR. SKAIFE: It might be interesting to know that the Town of Westmount, one of the outskirts of this city, intends to put in an English incinerator, and we expect to get quite a good return in horse-power out of it. I do not know the name of the maker or

anything else about the details, but it has been decided so, after the matter was thoroughly gone into.

MR. HOWARD: I saw the Trenton plant when it was not working very well. A great deal of flying particles were going about, and there was some danger of fire. I understand that this was afterwards suppressed.

MR. DECARIE: The plant that they propose establishing at Westmount is what is called the "Horsfall" of England.

That was purchased because the people of this country are not in a position to get tenders, or to give any information in Canada or the United States. I endeavored to get our plant before the officials of the town, but it was no use, and I know that they decided to purchase a "Horsfall," which is something like the one they have in the City of Montreal.

BY LETTER.

MR. J. T. FETHERSTON, Acting Superintendent Bureau of Street Cleaning Borough of Richmond, New York: Referring to the paragraph concerning the Dixon furnace in the Borough of Richmond (Staten Island) several statements are made which are partially or wholly incorrect. The second and third sentences read:

"Here the cost for labor, fuel and repairs in 1903 was $2.44 a ton. In 1904 it was $2.88, and for the first six months of 1905 it showed a cost of $3.47."

The above costs are really based upon supervision, supplies, labor, fuel and repairs, not upon "labor, fuel and repairs" alone. The cost for the first six months of 1905 was taken from a progress report, and should not have been quoted as a representative cost without explanation. Later, in the same paragraph, the author states:

"The ash is from 25 to 30 per cent of the weight of the material burned. This means incomplete cremation." No figures on ash resulting from the burning of garbage in the Dixon furnace in this borough were given to the author of the paper on the occasion of his visit to the writer's office, so there is an error in this statement and consequently in the deduction that cremation was incomplete.

The high cost of burning garbage in this inefficient type of Dixon furnace is due to the necessity for completely cremating the material, as the furnace is located in a business and residential section, where nuisances due to incomplete destruction of decomposable matter would quickly be suppressed. No complaints have been received against the crematory during the past year.

Concerning the Smith crematory at Atlantic City, the author states:

Mr. J. T. Fetherston kept a careful record of a week's run one summer when it was running full and consequently at the least tonnage cost, and calculated $1.48½ per ton."

This statement, in connection with the author's cost ($1.70 per ton through the year), is misleading and incorrect. The writer spent one week during the summer of 1903 at the Smith crematory, Atlantic City, in making observations, conducting a check run of the plant and collecting data on costs. The figures quoted by the author ($1.48½ per ton) was an average cost for two years (1901-1902) and included supervision, labor, supplies and repairs, figures being obtained from official documents in the office of the comptroller of Atlantic City.

BY LETTER.

MR. BAYLES: It is always unfortunate to misunderstand what is told one. I have had some correspondence with Mr. Fetherston which does not appear here. With some difficulty I recalled to his memory the fact that he *had* given me several ash percentages. They were, he explained, the results of special test runs made with selected and weighed refuse, and not representative of normal operation. That I misunderstood their significance was deplorable, but I must insist that it was purely misunderstanding, and not willful misrepresentation. The same causes are responsible for my having stated incorrectly the manner in which the Atlantic City figures were arrived at. In the matter of the Dixon crematory on Staten Island, it would have been more exact to have stated that the cost per ton covered operation and maintenance. The intention was to express the idea that it covered all costs properly chargeable against the plant. My apologies for having been inexact in saying so.

It gives me pleasure to quote one of the most eminent engineers of the country in saying that Mr. Fetherston's report on the Atlantic City plant is probably the most exact and comprehensive ever prepared.

THE PRESIDENT: If there is no further discussion on those papers, we will pass on to the next item on the order of business, which is the report of the Committee on Street Lighting—"Electric Lighting, with Special Reference to Underground Construction," by the chairman of the committee, Mr. E. A. Fisher, Rochester, N. Y.

Mr. Fisher presented the following report of the committee:

REPORT OF THE COMMITTEE ON ELECTRIC STREET LIGHTING.

BY EDWIN A. FISHER, CITY ENGINEER, ROCHESTER, N. Y., CHAIRMAN.

The chairman of your Committee on Electric Street Lighting regrets that he cannot submit a committee report, but is obliged to beg your indulgence while he presents a brief paper upon the subject, having special reference to the portion of the lighting plant occupying the public streets.

SYSTEMS OF ELECTRIC STREET LIGHTING.

Incandescent lamps are not adapted to street lighting and are not so used, except in special cases, and will not therefore be considered.

Electric arc lights may be divided into two general classes, the open arc and the enclosed arc. The enclosed arc is rapidly superseding the open arc to the great improvement of street illumination. Mr. W. D. A. Ryan, in summing up the results of a series of careful experiments to determine the relative merits of open and enclosed arc lights for street illumination, says: "Open arcs give a higher maximum candle power than enclosed arcs of corresponding voltage, but the maximum candle power is in an undesirable direction and the light fluctuates through very wide limits.

"Enclosed arcs give a higher candle power through the most useful angles from 3° to 10° below the horizontal. The light is more uniform and steadier and generally superior, from an illuminating point of view, to the open arc."

It may also be said that they are less affected by unfavorable weather, and the outages are materially less.

The enclosed arc is maintained for much less than the open arc, and we therefore have a condition where it is to the financial interest of the lighting contractors to comply with the demands of the public for the most efficient light.

Arc lights may also be again divided into two general classes, constant potential or multiple arcs, and constant current or series arcs. There is no material difference in the quality or quantity of illumination in lamps of the same capacity, in the two systems. The first or constant potential lamp is used where it is desirable to limit the voltage, and generally near the center of distribution. The current on the conductors is usually about 110 volts. This is reduced in the lamp from 72 to 80 volts.

The system generally used is the constant current or series arc. The voltage on the line depends upon the number of lamps in the current, it being generally about 76 at the arc. The number of lamps in general does not much exceed 50, making the maximum line of voltage about 4,000.

Both of the latter systems may be again subdivided into the direct current lamp and alternating current lamp. Mr. Ryan made a careful study of the relative merits of the direct current enclosed lamps and the alternating current enclosed lamps, and arrived at this conclusion:

"The direct current enclosed arcs produce slightly higher candle power than alternating enclosed arcs of corresponding voltage, but so far as illuminating value is concerned the two lamps are, generally speaking, on a fair basis of equality, both being superior to the direct current open arc."

The luminometer tests of Mr. Ryan show that the direct current lamp illuminates about 4 per cent greater distance than the alternating current lamp of same voltage. Tests by the writer of lamps in use in Rochester, N. Y., gave similar results.

There are, however, important advantages to the operating company in the alternating system, and it is now used in many cities. The General Electric Company, in its Bulletin No. 4359 of January, 1904, says: "Since the introduction of the alternating current enclosed arc system in 1898 orders have been received from over 700 central stations for 1,650 transformers, having a total capacity of 82,500 lamps."

Alternating current lamps should be equipped with street reflectors. It should also be remembered that true watts, or the reading of the watt meter, is the measure of the capacity of the alternating lamp, and not the apparent watts or the product of the volts by the amperes. Thus a 7.5 ampere alternating lamp is substantially equivalent to a 6.6 ampere direct current lamp of the same voltage.

The use of the alternating current of high potential on overhead wires in close proximity to telephone wires paralleling the same interferes more or less with the use of the telephones on these parallel lines.

The direct current open arc system in Rochester has recently been changed to the alternating current enclosed system. The lamps are about 7½ ampere and not less than 450 true watts. The circuits have about fifty lamps each.

Considerable interference was caused at first to the telephone currents on overhead lines on the same poles and in proximity to the electric lighting wires, and fears were expressed that the telephone service would be rendered useless during the operation of the lights. In December last

the writer received replies to a letter of inquiry relating to the matter from the folowing cities that have had the alternating current series arc lamps in use:

Des Moines, Iowa	378 lamps.	6½ amperes.
Hartford, Conn	804 "	6¼ "
Lowell, Mass	530 "	6½ "
Trenton, N. J	432 "	7½ "
Holyoke, Mass	493 "	6.6 "
Atlanta, Ga	901 "	

The maximum voltage was generally about 4,000. The replies from all, except one city that had no trouble, stated that there was at first some interference, but that it had later been taken care of by the telephone and the electric lighting companies so as not to materially interfere with telephone service. There is no trouble whatever in the underground wires. Rochester has 2,455 alternating current series lamps, and is passing through exactly the same experience as the cities named.

CLASSIFICATION OF ARC LAMPS.

Electric arc lamps for street lights are popularly classified in terms of candle power, and by electricians in watts energy per lamp. What is known as a 2,000 c. p. lamp requires in the lamp, according to New York City specifications:

On direct current	425 watts
On alternating current	450 true watts
Rochester specifications (at arc)	450 true watts
1,200 candle power—	
New York City specifications, direct current	320 watts
New York City specifications, alternating current	350 true watts
Rochester specifications, alternating current (at arc)	360 true watts
900 candle power—	
New York City, direct current	230 watts

The 900 c. p. lamps in New York are used in pairs. The 360 watt lamps in Rochester are used on the constant potential system and mostly in pairs.

Another method of designating the capacity of arc lamps on the series system with uniform voltage in each lamp and constant current is as follows:

7.5 Ampere lamps, called 2,000 c. p.
6.6 Ampere lamps, called 2,000 c. p.
5.4 Ampere lamps, called 1,200 c. p.
4.4 Ampere lamps, called 1,000 c. p.

The actual candle power of the arc lamp is much less than the nominal candle power, and is very difficult to determine For this reason the National Electric Light Association in 1894, at its seventeenth annual

meeting, appointed a committee, mostly professional men, to consider and report a definition of a 2,000 candle power lamp. The report of the committee was as follows:

"Recognizing the difficulty, if not impossibility, of measuring with any degree of accuracy the illuminating power of the arc lamp, and the great necessity for a more precise definition and statement of the obligations of the products of electricity for illuminating purposes to the consumer thereof, be it

"Resolved, That in the opinion of the convention what is ordinarily known as a 2,000 candle power arc lamp is one requiring on the average 450 watts for its maintenance, the measurements being made at the lamp terminals, where no sensible resistance is included in series with the arc. In case such resistance is used it must be excluded in the measurement of the voltage."

In addition to the unanimous testimony of practical electricians in favor of the resolution, the late Professor Rowland, acknowledged to be the highest scientific authority on the subject, said:

"It seems absurd to call a thing 2,000 candle power when it is not 2,000 candle power. You cannot by calling it that make it so. If you draw your contract to furnish 2,000 candle power, then you have got to furnish 20 or 30 amperes. * * * The only right way of doing it is to designate the number of watts, or, if you want to divide it up, you may also give the number of volts and amperes. That means something scientifically; but to say so many watts make a 2,000 candle power light cannot be maintained. The proper way is to decide the amount of current and *say nothing about the light,* and then if you want to know how many candle power of light it is, I hope you will be honest enough to say that it is about 500 candle power."

CAPACITY OF ARC LAMP BEST ADAPTED TO GENERAL STREET LIGHTING.

Mr. Ryan, in addition to the studies in street lighting heretofore referred to, investigated the question of small versus large units for economical street lighting. He shows that for a certain standard of illumination there was required in one mile of street:

10.68—7.5	Ampere,	485	Watt,	alternating	current	lamps	using	5,180 watts current.
11.63—6.6	"	425	"	"	"	"	"	4.940 "
13.41—5.4	"	350	"	"	"	"	"	4,640 "
14.85—4.4	"	285	"	"	"	"	"	4,235 "

The relative lighting distance efficiencies, taking the 4.4 ampere 285 watt lamp as a basis, are as follows:

285	Watt,	Alternating	Current	100	per cent.
350	"	"	"	90.2	" "
425	"	"	"	85.7	" "
485	"	"	"	81.7	" "

Taking into account the power used only, the smallest unit practicable to operate is the most economical. The fact is, however, that the cost of

producing the current for electric lights is from 40 per cent. to 50 per cent. only of the total cost of an arc light, and the saving in current would therefore be partly offset by increased initial cost and maintenance per mile for the additional small units required.

PRESENT PRACTICE.

Statistics gathered by Mr. C. F. Lacombe, engineer surface construction, Boroughs of Manhattan and the Bronx, published in the annual report of the Department of Water Supply, Gas and Electricity for the year 1903, shows that out of ninety cities supplied by private plants sixty-eight, or 75½ per cent used the 2,000 nominal candle power 450 watt lamp. The remaining 24½ per cent, with one exception, used 1,200 nominal candle power, 320 to 350 watts. Municipal plants show similar percentages. One city only, Cincinnati, uses alternating current series lamps of 4 amperes 75 volts, or 300 apparent watts. These lamps are not allowed to be set over 300 feet apart in the business district, and not over 400 feet in the residence sections. They are set very low on small iron poles, and from a personal observation I should say that while lighting the streets fairly well they do not illuminate the buildings, and the general effect is not as good as when larger units are used.

The lamp specified for the main part of the city lighting by the commission appointed by the mayor of New York City, consisting of Dr. Cary T. Hutchinson, Mr. Nelson P. Lewis, past president of this Society, and Mr. George F. Sever, was a 7.5 ampere alternating current series enclosed arc lamp requiring about 480 watts at the lamp terminals.

The specifications for the City of Rochester, made in 1902 after careful investigation, provide for a similar lamp for the larger portion of the street lighting.

While the unit generally used is the 2,000 nominal candle power, or 450 watt lamp, the writer is of the opinion that in any new installation or change, the question of a somewhat smaller unit should be considered. The number of lamps needed per mile is determined largely by local conditions, such as street intersections, kind of buildings, use made of the street, etc. In general, it may be stated that 450 watt lamps spaced 400 to 500 feet apart in fairly built up sections will give good lighting. In the business district this distance may be reduced to from 100 to 200 feet, and in unsettled sections made from 600 to 800 feet.

LAMPS AND OTHER FIXTURES.

For a description of modern lamps and appurtenances in keeping with improved conditions in city streets, reference may be made to the bulletins on the subject by the electrical companies furnishing these supplies. The writer also begs leave to refer to the papers printed in the Ninth Annual Report of this Society by W. H. Hillman on "Improvements in Electric Arc Lighting," and by Mr. Austin S. Hatch on the "Records of the City Electrician."

COST OF ELECTRIC LIGHTS.

In the 1903 report of the Department of Water Supply of New York City, heretofore referred to, is a table showing the cost per year and number of lamps of 2,000 nominal candle power in use in sixty-eight cities purchasing from private companies, the lowest being $60 per year, the highest, except New York, $125 per year; and the average, $88.60. New York paid $146. In twenty-three cities using 1,200 nominal candle power lights the lowest was $55, the highest, except New York, $109.50. New York paid $125.

In six cities operating municipal plants using 2,000 candle power lamps, the average cost was $66.45 per year; the lowest $47, and the highest $90. Similar costs for three cities using 1,200 candle power lamps show an average of $56.84. Higest, $68.54; lowest, $48.

The first number of *Municipal News* gives the statistics of cost of the sixty-nine 2,000 nominal candle power plants referred to.

Bare figures of cost without expert examinations into the conditions affecting actual cost are of value only in a general way in determining whether the price is fair or excessive in a given locality. In general the writer is of the opinion that, under ordinary conditions, where a municipality is well served at a rate in the vicinity of $75 per year for a 2,000 nominal candle power lamp, it would be inadvisable in the present unsettled state of the art of illumination to resort to municipal ownership.

ELECTRIC SUBWAYS.

A considerable portion of the arc lighting in the larger cities is in districts having underground conduits. The New York City report heretofore referred to states that Philadelphia had 9.15 per cent of its arc lights on underground wires, Cleveland and Newark about 10 per cent each, Milwaukee and Baltimore about 11 per cent each, Providence 13 per cent, Cincinnati 21 per cent, St. Louis and Chicago about 33 per cent each, and Washington 99 per cent. Rochester has about 15 per cent.

Previous to 1886 electric wires for all purposes were usually overhead. The enormous increase in poles, fixtures and wires disfiguring and obstructing the main streets led to an urgent demand by the public for a better system. The electric field at that time was occupied by numerous competing companies. The almost universal custom was to grant consents to these companies to construct subways in public streets and order the removal of overhead wires. The City of Boston is an example of this method. In 1901 the commissioner of wires having in charge this branch of the public service granted 1822 permits for underground construction, covering 147 different streets. These permits were granted to four different corporations for electric lighting and power purposes, and to fourteen different users of electricity for low tension service. Eight of the latter used conduits in common under the name of the Boston Low Tension Wire Association. The commissioner of wires informed the

writer that it was the custom to grant permits for the construction of subways in the streets so long as there was sufficient room to place them.

In Rochester the Bell Telephone Company owns and occupies about thirty miles of conduits. The city has the use of two ducts in each conduit for police and fire alarm wires.

The Rochester Gas & Electric Company has constructed about forty miles of conduits for general use, under a contract permitting the city to take it over at any time upon payment of the cost of construction.

An attempt by the city to compel the Bell Telephone Company to use these conduits resulted in a suit tried in 1901 before the Hon. Theodore F. Hancock as referee, in which some of the leading electricians in the country were called as experts to testify as to the question of danger in the use of a single conduit by both high and low tension wires. The decision of the referee was adverse to the city, largely because of the use of a common manhole for both kinds of service.

The question of the location of conduits in the larger cities is one causing a large amount of trouble to the officials having the matter in charge. Whether a system of open galleries, as advocated by Prof. Folwell at the Indianapolis Convention, will come into use, except in the largest cities, is doubtful. It may, however, be necessary for cities to take possession of the space under the sidewalks, or a sufficient amount of it to provide for the additional conduits necessary in the main streets.

It is the opinion of the writer that this is a branch of the public service that should be owned by and absolutely under the control of the municipality, irrespective of whether the lighting plant is a private or a municipal plant.

PUBLIC CONTROL OF STREET LIGHTING.

An economical and satisfactory service in the field of electric street lighting, street railways, gas and electric services of all kinds, and similar public utilities, requires a monopoly of the particular service for each locality.

The fierce competition between rival companies during the competitive era just passing has probably in some cases resulted in better service and lower prices. In most instances, however, it has left a legacy of over capitalized, poorly built, duplicated or triplicated plants to the present age of combination and consolidation. A similar condition obtains in respect to electric light and power consolidations.

The Municipal Electric Lighting Commission of the City of Baltimore said in a report made in February, 1900: "The commission is strongly of the opinion that open competition in service of the character rendered * * * can eventually have no other effect than to *increase* the *price.* This is the uniform experience of every city; a temporary reduction may be made, to be certainly followed by a *consolidation* and an increase in the price."

It may be asked, then how are the cities to obtain a satisfactory street lighting service at reasonable prices? There are three methods by which this will be acomplished:

First. By a proper appreciation of the self-interest of the corporation itself by its managers.

In a recent paper by Mr. Henry Wollman of New York, before the Commercial Law League of America, on the "Mortality of Trusts," he said:

"Trusts will live, not because they have great capital, nor because they have blotted out competition, but because they are conscientiously, economically and ably managed. Those that do not pursue the correct principles of business will go down. Those that are fortunate enough to do so will last. Those trusts that serve the public the best will survive; the others will perish off the face of the earth."

Second: By proper state supervision and control.

Massachusetts has for twenty years exercised such supervision and control through a commission of three members. New York has recently created a similar commission. Mr. Alton D. Adams, in writing of the powers and duties of these commissions, says:

"The commission in each of these states has general supervision of all persons and corporations engaged in the distribution of gas or electric energy by way of the streets or highways. In each state the power of the commission extends over both the physical and financial operations of corporations engaged in gas or electric supply. By the definitions of the New York statute, the term corporation covers a company, association and joint stock association, but does not include a municipality. The New York commission may regulate the physical operations of the gas and electricity systems operated by a city, village, town or lighting district, and may inspect the books relating to these systems, but cannot control the financial doings of a municipality in relation to its gas or electric business. In this respect the Massachusetts commission has greater powers, for it can fix, under certain conditions, the rates at which a city or town shall furnish gas or electric service to private consumers.

"No municipality in New York can erect and operate a gas or electric system for other than municipal purposes without authority from the commission. In Massachusetts this matter is not subject to the commission in any way, but it is provided by statute that a city or town cannot erect a gas or electric system, even for the sole purpose of lighting its own streets, without first buying the local system of the sort that it proposes to erect, if the owners of the local system elect to sell.

"One of the most important powers delegated alike to the New York and the Massachusetts commission is that of fixing maximum rates for electric and gas service. Neither commission can fix rates on its own motion, but can act in the matter only after a complaint to it has been made. In New York a complaint as to either the quality or rates for gas or electric service may be lodged with the commission by either the mayor of a city, the trustees of a village or the board of a town, in which a person or corporation is authorized to supply gas or electricity. One hundred consumers of gas or electricity may likewise bring a complaint before the commission as to quality or prices. After an investigation of

the plant and books of the gas or electric system, and after a public hearing before it, at which all interested parties may be represented, the commission may order an improvement in the service, or may fix the maximum price to be charged for gas or electricity. The price so fixed is the maximum price that may be charged for gas or electricity by the person or corporation affected in that place for a period of three years and until, after the expiration of this period, the commission shall again upon complaint reconsider the evidence and fix the price of gas or electricity."

It will thus be seen that in two states at least the actual practical supervision and control of electric street lighting companies is an accomplished fact, and should result in good service at reasonable rates. This, however, does not prevent any community from resorting to the third and last remedy,

MUNICIPAL OWNERSHIP.

Comparatively few of the larger cities in this country have as yet gone into this branch of the municipal service. Chicago and Detroit are the notable exceptions.

Mr. M. N. Baker, in his Municipal Year Book for 1902, says: "The percentage of cities having municipally owned electric lighting plants rises steadily with the decrease in population, there being only four public to 121 private plants in places of 30,000 and over and 111 public to 449 private plants in towns of 3,000 to 5,000."

While the movement for municipal ownership is steadily increasing in all branches of municipal service, it is a source of gratification that the larger cities generally do not follow blindly the popular trend, but make careful and thorough investigations before making a final decision. In this way only will progress toward the right settlement of this question be made.

MR. ROOT: Mr. President, before we proceed to the discussion of this paper, I would like to say a word in reference to the last two papers, in connection with the plant at Atlanta, if you will kindly permit me to do so.

I wish to say for the benefit of the members that our company (The Decarie Manufacturing Company, Minneapolis, Minn.) constructed the plant, and it was very gratifying to us to hear that the results had been so satisfactory. We did the job for $31,000 and charged up $26,000 against the plant for advertising. We had to break into the South, and break into business there, and we built that plant to handle the offal of the city, and built it successfully, I think.

We duplicated that plant at Los Angeles, California, for $71,-

000, and they think it is very cheap at that figure, so I guess we are going to raise the price.

MR. SHERRERD: With reference to Mr. Fisher's paper, I would like to ask him a question in respect to the trouble between the two kinds of wires carried in the conduits. Were there any high tension wires? I mean anything above two thousand volts?

MR. FISHER: Yes, sir, they run as high as 6,600 volts.

MR. SHERRERD: And was the complaint from the telephone people?

MR. FISHER: No. The question came up in this way. In 1892 a contract was given to the Rochester Gas & Electric Company to construct conduits in those streets, and that contract has been continued from time to time under an agreement by which the city has the right to take the conduits over at any time on payment of the cost.

In this contract it was specified that they should be built of sufficient size to take in all the wires of all the other conduits. The city then asked the Bell Telephone Company to abandon the construction of its system, and to go into the conduits of the Rochester Gas & Electric Company. This they refused to do, and that was the cause of the suit.

They first put in use this alternating system of lights, and run a voltage through the conduits of about four thousand. The result was that there was considerable interference with the telephone service—in fact I may say that there is still. I corresponded with some eight or ten cities which have been placed in the same position, and found that they have all had practically identical experiences, but they said that it had in time taken care of itself and that the electric light companies and the telephone companies had rearranged their wires in such a way that there was practically no difficulty.

Our experience has been that even yet the telephones are difficult to use in some parts of the city, but we hope that this will be overcome in time. Of course, in some parts of the city there is no trouble at all.

MR. SHERRERD: Where those high tension wires are run near telephone wires there is always a good deal of trouble. There is a special form of cable in which they run the telephone wires now, but I understand that when you get up into the really high voltages, such as 10,000 or 12,000 volts, that the telephone companies still have the same trouble as they always had, even if the lines are some thirty or forty feet apart.

I think that this is a question that is deserving of some consideration, because it is going to give a good many cities considerable trouble in the installation of conduits which may be used by the electric light companies, and by the telephone companies.

MR. FISHER: We have not any trouble to speak of now, and we have no trouble where the wires are underground, any more than any of the other cities that I corresponded with. We have the wires running right in adjacent ducts in the same conduit. Of course they are in a cable, but they do not give us any trouble whatever. With the overhead lines there was trouble.

MR. SHERRERD: I understand that they have trouble with the telephone wires overhead, while the very high tension wires are in the conduits underground.

MR. FISHER: I hardly think that is possible. We have them in adjacent ducts, as I say—not more than two feet from each other, and there is no trouble whatever.

THE PRESIDENT: If there is no further discussion on this paper I will call upon the chairman of the Committee on the Place of Meeting to present the report of the committee. I understand that this report is ready for the meeting.

MR. POLLOCK, Chairman of the Committee on the Place of the Next Annual Meeting, then presented the following report:

MONTREAL, September 6, 1905.

Your Committee on Location of Thirteenth Annual Convention have received invitations from Chicago, Birmingham and Bedford Springs.

The latter is simply a hotel and was practically left out of consideration. After several meetings the committee could not decide unanimously

upon any one location to recommend and prefer to have the convention select a location without a definite selection from us.

Respectfully submitted,

C. D. POLLOCK, Chairman.
J. S. VINSON,
E. S. BARROW.

Mr. Grosser then read the following as the report of the minority:

MINORITY REPORT OF COMMITTEE ON LOCATION OF THIRTEENTH ANNUAL CONVENTION.

MONTREAL, CANADA, September 6, 1905.

The committee met at 7:45 P. M., September 5th, and selected Mr. Samuel A. Freshney as Secretary. Invitations were presented from Chicago, Ill., Birmingham, Ala., and Bedford Springs, Pa. The last place being simply a hotel, we scarcely considered it. The principal point against Chicago was the fact that we held a convention there in 1896. After considerable discussion the committee decided to recommend Chicago for next year. We felt very friendly towards our friends from Birmingham because they have been very faithful in attending our conventions at long distances from their city, but think it better to advise the selection of Chicago for 1906.

If we should succeed in getting a large increase in membership next year and Birmingham should invite us there for 1907, your committee would like to recommend Birmingham very strongly to your next year's committee.

Respectfully submitted,

HUGO S. GROSSER,

MR. HOWARD: Mr. President, I would move that the next meeting of the American Society of Municipal Improvements be held at Birmingham, Alabama.

I do not do this because any other city has been mentioned, but the report of the committee does not seem to suggest any place in particular, and we have never met in Alabama. Now, as a matter of fact we help the city where we meet, in a small way it is true, but still we help it, and it is only right that we should do our share in helping a city which has done the United States proud. If I can find a seconder I will put my motion before the meeting.

The motion was duly seconded by Mr. Rust.

After some discussion the motion was carried.

THE PRESIDENT: It is therefore the sense of this Society that the next annual meeting be held at Birmingham, Alabama. According to the Constitution the meeting will be held the second week in October, unless the Society decides otherwise. I suppose the best plan would be to hold the meeting according to the date set by the Constitution. I think that October would be about the best time of the year to visit the Southern city. It might be different in the North.

We will now proceed with the order of business. Our next business is to hear the report of the Nominating Committee. Mr. Sherrerd, are you ready to present the report of the committee?

The Nominating Committee's report was as follows:

MONTREAL, September 6, 1905.

Members of the American Society of Municipal Improvements:

GENTLEMEN: Were it not for the provision of the Constitution which states the President shall not be eligible for immediate re-election (unless by a unanimous vote), your Committee on Nominations recognizing the distinguished services rendered to the Society by our present efficient and energetic President, the results of whose efforts are shown in our increased membership, and the renewed interest taken in the Society, would have unanimously presented the name of Mr. Folwell for re-election. We, however, considered that the establishment of such a precedent might prove embarrassing in the future.

Your committee therefore recommend the following nominations for your consideration:

President—C. C. Brown, Indianapolis, Ind.
First Vice-President—John R. Barlow, Montreal, Canada.
Second Vice-President—Jas. Owen, Montclair, N. J.
Third Vice-President—Julian Kendrick, Birmingham, Ala.
Secretary—Geo. W. Tillson, Brooklyn, N. Y.
Treasurer—F. J. O'Brien, Oswego, N. Y.
Finance Committee—E. S. Barrow, Hamilton, Ont.; A. F. Eggers, Newark, N. J.; Fred Giddings, Atchison, Kan.

Respectfully submitted,
M. R. SHERRERD, Chairman,
C. H. RUST,
E. A. FISHER,
JOHN R. BARLOW.

THE PRESIDENT: Perhaps it might be in order for me to say a word of thanks for the compliment so delicately expressed in the opening words of the report, but I am glad that the committee has decided as it has, for I should have been obliged to decline the honor of re-election. I think it is a good provision laid down by the Constitution that the officers shall be elected every year, and that the same ones must not be re-elected.

MR. HOWARD: I move that the Secretary be instructed to cast a ballot declaring the officers nominated as elected for the coming year.

Which, being duly seconded, was carried, and the Secretary cast the ballot and reported the officers nominated by the Nominating Committee as elected for the ensuing year.

MR. BROWN: Mr. President, and gentlemen of the Society: It is too late now to make any lengthy speech, but I wish to express my gratitude to you for the very kind way in which you have elected me President of this Society. Of course I have been with the Society since the year two, if not the year one, so I know something of the ups and downs of the Society, and I know this, that the work of the officers during the past year, especially the work of the President, has resulted in a greater membership this year than we have ever had, and a better convention than we have had for a long time.

I can only add that I shall do all in my power to keep up what has been done already, and we hope that next year we will be able to report that the membership has increased quite as much, if not more, than it has this year, and with the help of our good friends from Birmingham we hope that our next convention will be as successful as this one.

I thank you again for your kindness.

THE PRESIDENT: There is one other subject that I would like to put before you before we adjourn. There was an amendment to the Constitution offered the first day of this meeting. You all remember it. It was to strike out the last clause of the first paragraph of Section 1, Article II, so that the section would read:

"Any municipality within America shall be eligible to membership in this Society; likewise any engineer, officer or director who shall have charge of or supervision over or be employed as a consulting engineer on any public or municipal department work."

The second amendment consists in striking out Article III altogether and replacing it by the following: "Each corporate member shall pay five dollars per annum, and each associate member shall pay ten dollars per annum. All dues to be payable in advance, on or before the date of the annual meeting."

MR. SHERRERD: I move that those amendments be adopted and that they form part of the Constitution.

Which, being seconded by Mr. Eggers, was carried.

And there being no further business before the meeting the session was adjourned.

FOURTH SESSION.

The fourth session was called to order by the President at 10:40 Thursday morning, September 7th. After the meeting had been opened formally, the President said:

We have the honor of having with us this morning His Honor Judge R. Stanley Weir, Recorder of the City of Montreal, who has kindly consented to read a paper to us on the subject of "Montreal Past and Present." I have much pleasure in introducing Judge Weir to you.

Judge Weir presented the following paper:

MONTREAL PAST AND PRESENT.

In attempting to comply with the request to discuss before you "Montreal Past and Present," I cannot but feel that the subject is one to be treated more adequately in a series of discourses or rather in a volume than in the necessarily brief limits of the present occasion. Montreal Past for instance, might lead us to a consideration of its interesting geological history, *i. e.*, the volcanic features of what we call our mountain traceable in its igneous rock—the same igneous rock that has preserved St. Helen's

Island from disintegration and that still defies the fury of the Lachine Rapids. Our topic more legitimately would permit us to discuss the site of the ancient village of Hochelaga, the probability favoring a location not far from where we are now assembled. It would surely be permitted us to tell the story of Jacques Cartier, the intrepid sailor of St. Malo, who 370 years ago landed here to the astonishment of the Indian encampments here, and of how in the words of one of our own poets, McGee,

"They brought their sick and maim'd for him to breathe upon
And of the wonders wrougth for them thro' the Gospel of St. John."

I may at least remind you of that memorable morning, the 17th of May, 1642, when a little flotilla containing Paul Chomedy de Maisonneuve, Montmagny, the governor of New France; Peter Vimont, the Jesuit Father, Madamoiselle Mauce, Madame de la Peltrie and others landed not far from where His Majesty's Custom House now stands. Their first act was a religious one, and when the rite was over, Pere Vimont turned and addressed the small company: "You are a grain of mustard seed," said he, "that shall rise and grow till its branches overshadow the land." And to quote the picturesque, if somewhat fanciful language of Parkman: "The afternoon waned; the sun sank behind the western forest and twilight came on. Fireflies were twinkling over the darkened meadow. They caught them, tied them with threads into shining festoons, and hung them before the altar. Then they pitched their tents, lighted their bivouac fires and lay down to rest. Such was the birthright of Montreal."

Although the population of Montreal under the French regime was small, the characteristic methods of that time were continued for many years, long after the cession to Britain. The narrow streets, the general style of construction of houses, the assemblage of farmers on market days, the crying of notices on Sundays after mass at the church doors and many other features might be instanced. Of course, there were no town councils or public meetings before the cession, and the chief ruler seems to have been the official known as the intendant. The intendant was appointed by the King of France and stood inferior to the governor alone in rank, while probably exceeding him in practical control of affairs in times of peace. He it was who forbade the habitants from galloping or racing their horses on leaving church, who laid down rules for the construction of houses, defining the angle of the roof and the thickness of the stone and also the alignment of the streets. It was the intendant who made regulations against fire; against nuisances and forbade children or grown persons to slide down the hills of Quebec and Montreal to the danger of pedestrians. Some of the intendant's ordinances were exceedingly strict, as for instance the forbidding of farmers to visit the town unless by special permission.

After the cession, General Murray who succeeded General Wolfe in command of the troops, administered municipal affairs with the assistance of an executive council, sitting at Quebec. Under the Quebec Act of 1774, which continued the system of government by an appointed executive, and under the Constitutional Act of 1791, which provided for an elected

parliament in addition to an appointed council, justices of the peace were the administrators in the City of Montreal. The central council or parliament enacted the laws under which the city was governed and entrusted the board of justices with the duty of seeing that they were obeyed. This was the system until Montreal received its first charter.

Although two hundred and sixty-three years have fled since Paul Chomedey, Sieur de Maisonneuve, planted the fleur de lis and cross at Ville-Marie, the city as a body politic and corporate is barely seventy-three years old, the royal assent of its first charter having been signified on June 5, 1832. The city was styled "The Corporation of Montreal." It was accorded certain borrowing powers, since enlarged to a degree that would have made old Jacques Viger, the first mayor, stand agape. It was also authorized to hold and possess goods, chattels, lands and tenements, real and immovable property; also to sue and be sued, to plead and implead, to have a common seal, "and the same from time to time at their will to break, alter and amend." The charter was brief, compared with the present one, containing but twenty-six articles, whereas that of today has nearly five hundred, and may in time, if the legislature continues its polite attentions, equal that of, say, St. Paul, Mo., which has seventeen hundred and ninety-four sections, covering over a thousand pages; or that of Brooklyn, where, in answer to a request for a copy of the city's charter, the mayor wrote me almost dolefully: "There is no charter, for the legislature so amends it every year that it is impossible to give the exact laws that govern." By its first charter, Montreal was divided into eight wards, namely, East, West, St. Anne's, St. Joseph, St. Anthony, St. Lawrence, St. Louis and St. Mary. The limits of these boundaries, which there is not time to mention, possess much interesting topographical and antiquarian information. Who now remembers the Little river and Charland's new bridge in the West ward, or la Pointe a Callière in St. Ann's? How the sight of the names Rocollet and Quebec Suburbs, La Place des Commissaires and St. Anthony's ward, must carry back the memories of old inhabitants! Citizenship was limited to every male person of the age of twenty-one years being proprietor of a house, and of the ground on which the same is built, or of a vacant lot of ground within the city, and who shall have resided in the city during twelve calendar months before the time of election." All such persons were styled members of the corporation.

A good deal of wisdom is discernible in this first charter. The mayor was styled "chief executive officer." It was his duty to be vigilant and active at all times in causing the laws for the government of the city to be duly executed; and as far as was in his power to cause all negligence, carelessness and positive violation of duty to be duly prosecuted and punished. These duties were wholly omitted from later charters, and in the revision of 1889 not a line was given to defining the duties of the mayor beyond the bald statement that he shall preside at all meetings, is ex-officio a justice of the peace, and entitled to draw a salary of not more than $2,000 per annum. The revision of 1899, besides doubling the mayor's indemnity, has given him important powers of veto and control.

For the election of the first common council the justices of the peace, who, prior to this date, were civic administrators, held a special session on the first Monday of May, and appointed the place of election in each of the wards. Notice of this meeting was given by publication in all the newspapers of the city, and at the doors of the churches after divine service in the mornings of the two Sundays preceding the election. The duly qualified members of the corporation were then permitted to meet at the place so appointed on the first Monday of June following to elect, for their respective wards, between the hours of 10 A. M. and 4 P. M., two common council men possessed of real estate of yearly value of £25 currency. Open voting was the vogue, and false swearing or personation was dealt with severely. Within fifteen days after their election the common council men met in the court house, "in the room in which the justices of the peace hold their special sessions," to elect one of their number mayor, and thereafter to proceed to the business of the corporation.

The common council was declared to have exclusively the same powers and authority as the justices of the peace for the city and town of Montreal possessed by law, touching police, assessments, streets, markets, weighing houses, watching and lighting, and generally over all things regarding the improvement, cleanliness and convenience of the city. The first meeting of the council, or corporation, as it was called, was held on June 5, 1833, and Jacques Viger, whose name is commemorated in the square that bears his name, was elected mayor, not by the people, but by the councillors, whose chairman he was to be. Each ward elected two councillors. The council, however, elected the mayor. I find also in this charter an excellent check on the council. It was there enacted that before having force and effect every by-law and ordinance had to be submitted to the Court of King's Bench for approval, after due publication by newspapers and the town crier. Our old charter also contained simple and effective expropriation regulations. When the city wished to acquire ground for opening new streets an attempt to purchase by agreement was made. If this failed, resort was had to arbitration; only in the case of proprietors being absent or refusing to conclude an agreement or appoint an arbitration, was recourse had to judicial arbitration; compulsory municipal service was also a feature of the city's first charter, it being enacted that if any person duly elected refused to serve in the common council he should pay the sum of £25 currency. This charter remained in operation until the first of May, 1836, too short a time to afford its merits a fair trial. For some reason that cannot be devined, the renewal of the charter was refused. "Since then," says Lord Durham, in his famous report, page 36, "These cities (referring also to Quebec, whose charter, identical to that of Montreal, was also refused renewal) have been without any municipal government, and the disgraceful state of the streets and the utter absence of lighting are consequences which arrest the attention of all, and seriously affect the comfort and security of the inhabitants." In April, 1836, the Governor-General wrote to the Mayor of Mon-

treal, suggesting that in view of the approaching expiration of the term for which the charter was granted, the council would appoint a magistrate, with a suitable remuneration, to sit regularly for a stated time every day to hear and determine all cases cognizable by magistrate and to organize and pay a small but efficient body of constables or police officers to protect and watch the town. His Excellency believed that as this would be a purely local arrangement, and for the benefits of the inhabitants of the city, they would not object to raise amongst themselves by voluntary assessment the necessary funds for the purpose. On motion of the redoubtable Dr. Nelson, however, a respectful letter was sent in reply, in which the council pointed out that they could not exceed the limits of their charter, and in declining participation in the suggestion of His Excellency, assured him that "however unfortunate the city might be in not possessing municipal government, nevertheless it appears preferable to the common council that there should be none rather than to have one of arbitrary creation." This letter clause was, it may be imagined, rather intended to convey a hint as to the way in which government by a central executive, instead of by a common council elected by citizens, would be regarded.

On May 2, 1836, the Court of Special Sessions, which during the term of the city's charter had ceased to administer the city's affairs, resumed their sittings, and continued them until August, 1840. In the year 1840 the city received another charter from the special council that sat in Montreal in the Chateau de Ramezay from 1839 until the Act of Union of 1840. Its new corporate name was "The Mayor, Aldermen and Citizens of the City of Montreal." The Governor-General, the Hon. C. Poulett Thomson, was authorized to name the new mayor, aldermen and councillors for the first term, ending December, 1842, and his nominees were the Hon. Peter McGill, mayor, with eighteen councillors, among whom such familiar names as Ingles Quesnel, C. S. Rodier, J. G. Mackenzie, John Donegant, Colin Campbell, Stanley Bagg and William Molson are to be found. The population of Montreal in 1840 was 40,000, and yet eighteen representatives were not thought too many. In 1843 a new corporation was elected under the provisions of the charter granted by the special council. The city was divided into six wards only, namely, East Centre, West, Queen, St. Lawrence and St. Mary. Each ward elected three members. The council elected one of their number mayor, and six others as aldermen, the remainder being styled simply councillors. The mayor elected under this regime was Joseph Bourret, and the first elected aldermen of the city were Joseph Masson, Benjamin Holmes, William Molson, C. S. de Bleury, John Redpath and Joseph Roy. Among the councillors we meet for the first time the honored names of James Ferrier, William Lunn and John Mathewson. In 1844, by virtue of 8 Vic., Cap. 59, another arrangement of wards was made. The city was divided into nine wards. Three of these, East, West and Centre, were called city wards, and returned three members each; the remaining wards were called suburban wards, and elected only two members each. The full council thus numbered twenty-one, the population of the city then being about 45,000.

The next change in the constitution of the council took place in 1852, when, by virtue of 14 and 15 Vic., Cap. 128, 1851, the election of the mayor, who had hitherto been the choice of the council, was confided to the people. The number of aldermen was increased to nine, and the suburban wards, which had been steadily growing in population, were given the right to elect three members instead of two, all the wards thus having equal representation. This change increased the numbers of the council to twenty-seven, being one more than the present council, although the population of the city in 1852 was only 57,715. The numerous meetings which recent councils seem to find necessary for the dispatch of civic business is quite a modern feature—the statute of 1852 provided for only four quarterly meetings in each year. Special meetings, it is true, could be called by the mayor, but, failing his consent, a requisition stating the object desired was essential.

There have been revisions of the charter in 1889 and 1899, although every session of the legislature amendments are introduced not always, it is to be feared, with a view to the general interest.

MONTREAL PRESENT.

The problems of Montreal Present have been pretty much those of other modern cities called upon to deal with the new conditions created by the enormous industrial and commercial expansion of the past twenty-five years and the application of electricity to various public utilities. In common with many cities that have developed rapidly Montreal has suffered from more or less unavoidable lack of prevision, from more or less of imposition by companies authorized to exploit public franchises, more or less neglect to control in an orderly manner the various activities that have dug up her streets and erected forests of poles and impenetrable networks of wires. The almost simultaneous introduction of the telephone, the trolley car and the paved or asphalted street have resulted in some confusion with consequent waste of money and energy. Great as the addition to our convenience has been, the loss in beauty so far has been lamentable. Our cities in some respects are uglier than ever and are certainly noisier. But we are yet in a stage of transition. It is a question of time, and let us hope a short time, when these street poles will be removed and all overhead wires disappear underground. If, then, the storage battery replaces the trolley and the cable and the street car runs as it should, on rubber tires, the present Babel roar will happily give place to a reasonable hum that will bear less heavily upon our nervous senses.

FRANCHISES AND MUNICIPAL OWNERSHIP.

The whole question of the treatment of such a city as Montreal by the legislature and even by parliament is one which offers a good deal of difficulty and dissatisfaction. The city feels that it has too often to combat efforts to obtain special rights which ought to be referred to it exclusively. The feeling is general that the community is in constant danger of oppression from corporated interests who have won special

favors from the civic council itself. It is not strange, therefore, that a good deal of jealousy, if not hostility, has shown itself against certain private companies that exploit public franchises without due regard to the principle of a fair quid pro quo. This jealousy or hostility, however, tends to be modified as the public feels it is being well and fairly served. It is quite noticeable that certain companies are popular in Montreal while others are exceedingly unpopular, and the measure of this satisfaction or dissatisfaction varies precisely as citizens feel that they are being fairly or unfairly served.

The familiar topic of municipal ownership has not yet reached the practical stage with us. Here again the modern city is in a condition of transition, or perhaps it would be better to say of inaction. This is because many corporations are in possession of legislative privileges extending over lengthy unexpired terms, the expropriation of whose vested rights would involve heavy expenditure, and also because the sentiment is very general that municipal ownership by no means guarantees either efficiency or economy. The ideal community where graft and nepotism and patronage are unknown is the community where municipal ownership may safely be practiced. In Montreal the chief difficulties are that the public utilities have all been exploited by joint stock companies who are in active and lucrative possession. The water system is municipally owned, and administered and in a fairly satisfactory manner; and if the way were clear to administer civic railways and electric utilities no doubt the attempt would be made. But there is a curious superstition widely prevalent that the city has no warrant in earning a surplus over expenditure in regard to the supply of water, and there would be the same tendency, it is to be feared, if the range of municipal ownership were widened. Education, experiment and experience, however, are potent factors in all human affairs and are likely to be applied in many cities to the question of municipal ownership.

STREET WIDENING.

The improvement of public roadbeds in streets and public places, consequent upon an appreciation of the superior beauty, economy and general utility of well paved thoroughfares, has called for large expenditures. The general demand for every city of even the most modest ambition is for clean streets—the dissatisfaction with dirty streets is a healthy sign. Montreal feels that she has yet a good deal to accomplish in regard to her streets, both in summer and in winter. Here again matters have not reached anything like a definitive stage, although the general consensus of opinion is that a general amelioration is urgent. The question involves large expenditure, but I imagine there would be no difficulty in collecting by taxation the necessary additional money, were a stronger feeling prevalent that an intelligent economy in administration could be secured.

One difficulty and financial burden peculiar to Montreal and involving large financial burdens has arisen from fact that the city, like Jerusalem of old, is most compactly built together. Many of the leading streets

were extraordinarily narrow. St. Paul street, one of the narrowest streets in the city, gives one a fair idea of the original width of such important thoroughfares as St. James, Notre Dame and St. Lawrence streets. Many other streets also have been widened, and although we have been far from paralleling the Haussman frauds of Paris, it is generally admitted, to say the least, that the city has not dealt ungenerously with the proprietors who have been indemnified for the expropriation of their lands and buildings.

ANNEXATION OF SUBURBS.

At the present moment Montreal is negotiating with the numerous smaller municipalities which touch her circumference at every point for their formal and legal annexation with a view to the creation of a larger Montreal in partial fulfillment of the vision of a Greater Montreal to embrace at least the whole island with its area of about 350 square miles. The union of these adjacent towns and cities, for such they all are, with the metropolis is not coercive, but requires consent. Whether or not these eventually become attached to the city by formal legal bonds, the fact is clear that to all practical intents and purposes they actually form a part of the City of Montreal, owing their origin to it and being constantly dependent upon it. When these suburban places are well governed the larger city need not concern itself anxiously to secure their legal absorption, even at the sacrifice of a natural sentiment in favor of a Greater Montreal, but manifestly when they are administered recklessly as, for instance, in regard to matters of public health, Montreal is vitally interested. The negotiations between our city and the suburban towns to which I have referred illustrates an interesting consequence of our recently improved facilities for transit on which I may dwell for a moment. When a person is obliged to go on foot from his domicile to his place of daily business, it will be found that the maximum distance that he will be content to travel will be from three to four miles. But as this is speedily found to be irksome, the greater convenience having always the stronger attraction, a great many, rather than undertake this daily walk, will prefer to unite their domicile to their place of business, when possible, and such, in fact, was the practice for many decades in Montreal and elsewhere. In Montreal moreover climatic considerations, combined with the fact that hills and creeks interposed between the mountain and the river, to bring about *great density* of occupancy. The farmer, however, with his indispensable horse and vehicle could comfortably get himself to the center of old Montreal, transact his business and get home again from a distance of five or six miles. But for the same reason, if he penetrated farther into the unoccupied land, he would not care to be more than five or six miles from his neighbors. In England, where traffic has been horse traffic for many centuries, we find the country towns ranging according to the roads and gradients, separated and yet within touch at eight and fifteen miles, and this distribution there is singularly uniform. In accordance with a very similar law, the various villages that surround Montreal grew up distinctly

separated from it by land more or less under cultivation, and yet within easy coming-and going-distance by horse. The horseless man got as close to his daily occupation as possible; the man with a passion for a villa, able to keep his horse, or if not, willing to trudge, moved out a few miles while the farmer or habitant was the outlying pioneer. It is easy to see how the development of trade through the invention of steam power, followed by the electrical tramway, have enormously altered conditions. The man with daily occupation in the city can fix his dwelling ten, fifteen or twenty miles away, and yet by cars or tramway be as punctual as the man whose dwelling is one, two or three miles distant, but who foots it. Thus we observe the truth of the law operating in the neighborhood of all modern cities that have adopted modern transport facilities, that the distribution of population is directly dependent on such facilities. Incidentally we see how it comes to pass that we have in this city a Greater Montreal—an overlapping of the old city into the surrounding territory. (See Anticipations by H. G. Wells.)

Gentlemen, it might, perhaps not unreasonably, be expected that I should give you the statistics of Montreal's rapid progress within say the last decade, dilate upon her still commanding position as the head of navigation and as a railway center. I might dwell upon her schools and churches and colleges on the one hand and the extent to which crime and drunkenness and the darker evils of city life exist or are combated on the other. I might discuss the administration of justice, the daily press, the place of art and letters, manners and morals, sports and pastimes, but these are matters of which some would require more time and more ability than I can claim, while the others are contained in any good guide book. I should feel happiest if I could encourage you in your most laudable efforts to realize ideals, to make our cities cleaner, honester, purer, lovelier and of better report. Practical idealists I would call you, and as such, bid you Godspeed.

MONTREAL AND THE UNITED STATES.

The early history of the United States is indelibly blended with that of Montreal, for it was from this city that many of the strong men of one, two and three centuries ago went forth to discover, to govern, to trade and to convert. On St. Paul street, just east of Place Royale, stood the birth place of *Pierre and Jean Baptiste Le Moyne,* the men who discovered the mouth of the Mississippi river, in 1699, founded New Orleans, and who were, between them, governors of Louisiana for forty-six years.

Between 1666 and 1668, *Jacques Marquette,* the great Jesuit missionary and discoverer, was a familiar figure in Ville-Marie, and he left the banks of the St. Lawrence on his voyage of discovery to the Mississippi. It was to Montreal that *Sir William Johnston,* of Johnston Hall, on the Mohawk, came in 1760, and on the site of the present Bonsecours market stood the residence occupied by his son, Sir John Johnston, Indiana commissioner, and it was here that peace conferences were held with the great Indian Chiefs Brant and Tecumseh.

At the corner of St. Peter and St. Paul streets stood the residence of *Robert Cavelier, Sieur de La Salle.* In 1666 La Salle came to Montreal, to go, ten years later, on his voyage of discovery into the Northwest and thence to the Gulf of Mexico. On the lower road leading from Montreal to Lachine can still be seen the remains of a fortified Seignorial chateau, which tradition asserts was the home of La Salle in the year 1668.

Near the Place d'Armes stood the house of *Sieur Duluth,* after whom the City of Duluth, Minnesota, is named. On Notre Dame street, west of St. Lambert Hill, was the residence of La Mothe Cadillac, who left the then little French village to proceed westward and found the now beautiful City of Detroit. A tablet on the Leeming Miles building, erected on this spot, records this fact. The Tourists' Information Bureau is in this building. In later years such men as *Washington Irving, General Montgomery, Benjamin Franklin, Arnold, Chase, Carroll* and *John Jacob Astor* followed one after the other to Montreal, each leaving a lasting imprint in the city's history.

A little tablet at the corner of Notre Dame and St. John streets, with the following inscription: "Forretier House. Here General Montgomery, emulous of repeating the great exploit of Wolfe, resided during the winter of 1775-6," reminding us that the city was once in the hands of our Southern neighbors. Sir Guy Carleton, whose name will always be associated with the Quebec Act, 1774, won back the city for us, and since then Montreal has stood secure, though again threatened during our troubles with the great republic to the South, in 1812-15. Its growth in population has been consistent. At the time of the cession to Great Britain the city had only a population of some 3,000; at the beginning of the last century this had increased to 12,000, and at the present time she boasts of some 350,000 inhabitants.

Besides these distinguished men, others might be named of more recent date who have done Canada the honor of paying it a visit from time to time. These gentlemen have usually left their native land in great secrecy and no small speed, and when efforts have been made in the name of international law to induce them to give an account of certain circumstances antecedent to their departure, have manifested extreme reluctance to leave their adopted country. We are not quite sure that we are very pleased to see such gentlemen among us; at all events we are not disposed to utter great lamentations when they are forced to return. So far as credible current history reports these gentlemen have never belonged to the American Society of Municipal Improvements.

CONCLUSION.

In conclusion, permit me to remind you, gentlemen, that while it is well that the material progress, comfort and stability of the modern city be well considered by those who are entrusted with administrative power and whom you are so qualified to advise, while it is well that all should be done that ought to be done for its health, good order and general welfare, we should never forget that the ideal city is one which also

makes its effective appeal to the sentiment, the imagination, the patriotism of its citizens. It is a great tribute to the indefinable but very real spell and charm of a city like Oxford that she could move one of her sons to write of her as "the beautiful city, so venerable, so lovely, steeped in sentiment as she lies, spreading her gardens to the moonlight and whispering from her towers the last enchantments of the Middle Age, ever calling us nearer to the true goal of all of us, to the ideal, to perfection. It is a great tribute to that civic excellence which not all the appliances of modern ingenuity can create or destroy that a city like Athens can move an English man like Lord Macaulay to supreme enthusiasm.

"All the triumphs of truth and genius over prejudice and power," he says, "in every country and in every age have been the triumphs of Athens. Wherever a few great minds have made a stand against violence and fraud, in the cause of liberty and reason, there has been her spout in the midst of them; inspiring, encouraging, consoling; by the lovely lamp of Erasmus, by the restless bed of Pascal, in the tribune of Mirabean, in the cell of Galileo, on the scaffold of Sidney."

The stirring historical events of which Montreal has been the center should make a constantly effective appeal to the sentiment and imagination of her citizens—not less strong should such an appeal be when one considers the probable future of the city, destined doubtless ere long to be the home of a million souls. It is the duty of every patriotic citizen, with the practical and scholarly aid that you gentlemen of this Association can give, to lay broad and deep and strong the foundations of the city, to create and hand down to posterity an authoritative tradition in favor of honest and wise administration so that in respect of health and comfort, and all proper conveniences as a city of homes and as a city destined to great commercial and industrial achievements, as well as a city that values things beautiful and of good report, it may do its part to promote and secure in this country and wherever its influence may extend, the blessings of true urbanity—of true civilization!

THE PRESIDENT: I am sure we all thoroughly appreciate this most interesting paper of Judge Weir's, and I beg to thank him in the name of the Society for his exhaustive treatise of the many interesting bits of Montreal's history. I consider that we have been specially fortunate in having such an able exposition of such an interesting subject, and thank Mr. Weir, both for myself, personally, and on behalf of the members of the Society.

We will now proceed with the order of business as laid down by the program. Our next item is a paper on the "Montreal Civic Asphalt Plant," by Mr. John R. Barlow, city surveyor of the City of Montreal, and Second Vice President of this Society.

Mr. Barlow read the following paper:

MONTREAL'S CIVIC ASPHALT PLANT.

BY JOHN R. BARLOW, M. C. S. C. E., CITY SURVEYOR, MONTREAL, CANADA.

The defective condition of many of the asphalt paved streets rendered it absolutely necessary that the city should be in a position to control the situation without being at the mercy of contractors. In the spring of 1903 the city council authorized the Roads Committee to call for tenders for the supply and erection of an asphalt plant and complete equipment. The tender price of Messrs. Warren Brothers of Boston, Mass., namely, $13,000, was accepted and the contract awarded in April, 1903. The plant was installed and operations were begun in June of the same year.

The plant's capacity is 1,000 sq. yds. of 2 in. topping per diem. The following is a general description of the plant:

The sand dryers consist of double 40 in. cylinders of 19 ft. 6 in. length, provided with an exhaust fan for furnishing induced draught. These dryers are self-contained, having a steel casing and a double steel roof with air space between to prevent loss of heat by radiation. The inside of the casing is lined half way back with special extra heavy fire bricks and the dryers are fitted with grates having an area of 40 sq. ft. The dryer is so arranged that the heat passes around the outside of the cylinders and then back through the center of them, which allows the heat to come into contact both with the steel shell and through the sand itself, which is kept constantly dropping through the hot gases. The hot sand is elevated by means of a continuous elevator to a revolving screen which can easily be shifted out of the way in case it is desired to run binder.

The bin and mixer are compactly arranged, so that the hot sand or stone can be drawn by gravity into the weighing box and from there into the mixer without having to handle it in any other way. The mixer is elevated so that the teams can back without hindrance.

The whole structure is built of steel, with the exception of the floor, thus securing a perfectly rigid structure which is not affected by shrinkage.

The two melting tanks hold 1,400 gallons each. A most important feature of the plant is the independent trackway which carries the asphalt bucket, by reason of which the jarring and vibration of the machinery is entirely eliminated from the delicate scales on the asphalt bucket and makes it possible to weigh accurately the asphalt for each batch. The power is supplied by a 35 horse power engine. The engine and boiler are mounted together in a room separated from the rest of the plant, so as to avoid damage from dust.

The apparatus supplied by the contractors for the purpose of collecting the dust did not prove to be satisfactory, on account of the large quantity of dust which escaped with the smoke. This dust caused a great deal of annoyance to the workmen and residents in the neighborhood of the plant. In order to overcome the difficulty, the engineer in charge, Mr. N. Cyr, devised and built a steel dust collector which effectively prevents the dust from escaping, and works in a very satisfactory manner. The

original dust collector was enclosed in canvas, and the improved dust collector referred to above is made of steel, and the dust and smoke is led into a tank of water where the dust is precipitated by contact with the water.

In addition to the tools necessary for the operation of the plant, the contractors were required to furnish the folowing tools for street paving purposes:

1 five ton steam asphalt roller.
1 fire wagon.
1 pitch kettle.
6 asphalt rakes.
6 asphalt tampers.
6 asphalt smoothers.
3 double eye asphalt cutters.

The whole work of erection was completed in a first class manner by the contractors, and the repairing of asphalt pavements immediately started by the city.

The entire plant, with the exception of the engine and boiler, is under one roof, and the building is quite large, wherein ample quantities of raw material is kept on hand. The city has since acquired an additional melting tank and duplicated all the above named tools, and keeps two gangs of men.

During the first two seasons there were 51,080 square yds. of repairs and new work done by the city; the new work consisted chiefly of re-paving streets, formerly paved with 3 in. tamarack blocks which were worn out. The average cost of the asphalt laid was $1.22 per sq. yd., and this figure includes all works in connection therewith.

When the asphalting work is suspended on account of wet weather the old asphalt taken from the streets is ground in a mill and prepared for use in the construction of coal tar composition sidewalks, so that no time is lost.

The city is this year making experiments with different brands of asphalt and hopes by next year to be in a position to determine which kind of asphalt is best suited to the conditions of our climate, and also to be able to ascertain the area that a ton of each kind will cover, together with the cost per sq. yd.

The total cost of the civic asphalt plant, including buildings erected in the corporation yard, tools, repairs, etc., has been to date, $22,881.35.

The approximate total area of pavements of all kinds in the city is 745,223.75 square yards, or 31⅓ miles. Two-thirds of this is now under the city's charge for repairs, and the balance is still under guarantees which expire yearly up to 1910.

In view of the fact that the city now has more than 500,000 square yards of permanent ways to keep in repair, the importance of possessing adequate means to maintain the streets in good repair cannot be exaggerated, and the results obtained with the civic asphalt plant has amply justified the expenditure the venture entailed, as not only has the work been done more economically and promptly, but it has been done in a more thorough and satisfactory manner than when done by contractors.

In conclusion, I am pleased to say that Montreal's civic asphalt plant has proven a big sucess, and if the means are provided, the local press and general public will henceforth have little or no cause to complain of the condition of Montreal's permanent ways.

MR. BROOKE: There is a delegation here from Winnipeg, and as they had the first asphalt plant on the continent, I think it would be interesting for us to hear what they might have to say in connection with the subject.

MR. SAUNDERSON: We have had an asphalt plant in operation in Winnipeg for about six years, and we lay all our own streets, and do everything for them. We had trouble at the beginning with the contractors. They put up asphalt plants, and of course contrived to charge us what they liked, but now we own our own asphalt plant the same as we do our water works and a great many other institutions of the kind, and are in a better position (I think) than any other city of our size to-day in the country.

Our city clerk is here and I presume he is familiar with the working of the plant, and the saving that has been effected by its operation. Perhaps he could give you some information about it.

THE PRESIDENT: There are some other papers which we have to consider, and I think that it would be well for us to get through them first.

The first of them is "A Description of Montreal's Fire Alarm System," by Mr. James Ferns. Mr. Ferns' paper is here, but he has not been able to be present himself. With your permission I will ask the Secretary to read it.

FIRE ALARM TELEGRPH; ORIGIN AND ADVANCEMENT.

BY JAS. FERNS, SUPERINTENDENT, MONTREAL.

Of all the departments of municipal service, there is none which has been the subject of more thoughtful and patient experiment than that of fire alarms, none that has been brought to a higher state of perfection in the last few years. That this should be the case is natural enough. In the old days, when the fire fighter had to do the best he could without the modern contrivances for facing and subduing a conflagration, the fire fiend worked his will, for when once a blaze had obtained a firm grip, and spread to all parts of a building, nothing could save tremendous loss.

It was not from books that the lesson was derived that the secret of success in beating the fiery element lay in discovering the trouble early and getting to work promptly to counteract it. Up-to-date fire engines, all the trusty allies of the present-day fireman even cannot prevent disastrous consequences, unless the brigades have early notification and clear directions as to locality. Of this fact the fire history of the last few years furnishes plenty of examples. The fire alarm telegraph was invented to supply just this need, and it has brought about a revolution.

Though a comparatively modern idea, the fire alarm telegraph has had a phenomenally rapid development. Fifty or sixty years ago no adequate means of locating a fire existed. On the breaking out of a blaze, it took hours to collect the firemen, who were at that time, by the way, volunteers, to the scene of their labors. Buglers were despatched through the town to arouse the citizens, and these, going from street to street, naturally took some time to bring the entire brigade to the rescue. In the meantime the fire was at work, and the result was, as a rule, the entire destruction of the burning premises.

In addition to the length of time required to summon the firemen in this way, another tremendous handicap to the effectiveness of the fire corps lay in the fact that no means existed of guiding the men to the field of action, unless an unusually large blaze could be distinguished. The companies were thus frequently misled, and precious hours wasted.

The origin of the fire alarm telegraph is due to the late Dr. W. F. Channing of Boston, who died in that city in 1901, at the ripe old age of eighty-one, having lived to see the idea which he had given to the world brought to its present state of perfection in practice. It was when Prof. S. B. Morse invented telegraphy, and before the system became a commercial success, that Dr. Channing, in 1839, conceived the idea of the fire alarm telegraph. In the month of June, 1845, he presented his scheme to the public through the medium of the Boston press.

At this time, however, Dr. Channing was not a practical electrician, and he found himself compelled to look about for an associate capable of working out the practical details of the movement. In this quest he was fortunate enough to secure the services of Moses J. Farmer of Salem, Mass., who was the practical man, and the inventor of most of the apparatus and instruments of the system. Prof. Farmer was an electrical engineer of rare ability and devised many useful inventions outside of the fire alarm telegraph in the course of his long life.

In his inaugural address, delivered January 3, 1848, Mayor Josiah Quincy of Boston recommended the consideration of the fire alarm system to the city council. It was not, however, until 1851 that affairs took a practical shape, and contracts were signed for the installation of the plant, which, it can be imagined, was in a very crude form at this early date. However, the work was pushed through, and a fire alarm telegraph for the City of Boston was an established fact, going into operation in April, 1852. The system was then in its infancy, and as it spread to different cities improvements were being constantly introduced, until at

present the fire alarm telegraph is as near perfection as it is possible to make it.

Philadelphia was the second city to adopt this municipal improvement in 1856, closely followed by St. Louis, third, in 1858, and Baltimore in 1859. Then came New Orleans in 1860, Charleston, S. C., in 1861, Montreal (the seventh) in 1863, being the first city to adopt the system in Canada. Washington was next in 1864, Louisville, Ky., in 1865, San Francisco in 1865, Chicago in 1865, Cincinnati in 1866, and Quebec in 1867. Other cities followed in rapid succession, and it would be difficult at the present time to discover even a small village that is not equipped in some way with an alarm system.

The importance of prompt fire alarm service is incalculable. The history of every conflagration and every disastrous fire in a large city will show that a delayed fire alarm was one of its chief causes. If the alarms were always received at city fire headquarters immediately after the outbreak of a fire, large fires would be of extremely rare occurrence. With instantaneous alarms universal, it would require most unusual conditions, such as streets blockaded, or the failure of the water supply, to produce either a conflagration or a large fire.

With modern fire apparatus, the time now used in getting out after alarm is reduced to a matter of a few seconds. Human effort has reached its limit in this direction, and there is no room to save even five seconds more, except in getting in alarms more promptly. So in addition to the regular system of street fire alarms, the use of the private alarm system, connected with this, is coming every day into higher favor, and often results in a great saving of property.

In connection with the operating of a fire alarm telegraph service there are certain axioms which cannot but be recognized if the best results are to be obtained. In all cities the central fire alarm office should be in a fireproof building, so situated that there are no fire traps or high building surrounding. For this reason a residential district is preferable. It is to be desired, also, that there should be an open space all around the building.

The alarm boxes should be placed on specially constructed lamp posts on the street corners, each provided with a 16 c. p. lamp, to enable the box to be readily discerned at night. As regards the numbering of the boxes, the "district system," such as has lately been introduced in Montreal and is in use in the largest American cities, is distinctly the best. This system implies a saving of time, as when the first number sounds on the gongs in the stations the firemen know at once whether the call is in their district or not.

When one considers the extent to which the public interest is at stake on the prompt and accurate indication of the fire alarm telegraph the necessity of maintaining this system to the highest degree of efficiency is plainly seen to be of primary importance. A few minutes' delay or irregularity in sounding an alarm may involve a disastrous conflagration. Thus no money should be spared to reduce the chances of derangement to a minimum.

The trend of the modern invention is towards simplicity and accuracy in apparatus, as opposed to the complicated fittings of former years. To this end the old style gravity batteries should be replaced by storage batteries or dynamos, which are at once much more reliable and less expensive. No city can afford to neglect an opportunity of improving its fire alarm service, as this investment is one which never fails to pay.

Another point of importance to be taken into account is the necessity of placing all fire alarm wires in subterranean conduits. Aerial wires should be abolished entirely, a valuable aid to decreasing chances of derangement. In this connection it is but fair that electric companies should give the city the use of their conduits free. In Montreal the fire alarm department has to pay for all the privileges it obtains, while in almost every other city companies are glad to grant the fire alarm service their privileges free. Legislation should be resorted to, if necessary, to compel companies to do likewise in Canada.

As regards the staff of a fire alarm department, much depends on its men being thoroughly competent, sober and reliable. Men who are capable of exercising ability and resource in an emergency should compose such a staff. No fire alarm office should have less than two operators on duty at the same time.

To sum up, the fire alarm telegraph service of a city is one of its most important municipal departments. The lives and properties of the citizens are to no small extent in the hands of this department, and so it is a pressing duty to make every detail of the service as perfect as money can make it.

THE PRESIDENT: We have now a description of the Montreal Water Works System, by Mr. George Janin, superintendent of the Montreal water works. Mr. Janin is not here, but we have his paper, and I will read it to you in his absence.

The President then read Mr. Janin's paper, as follows:

HISTORY AND DESCRIPTION OF THE MONTREAL WATER WORKS.

BY GEO. JANIN, C. E., SUPERINTENDENT MONTREAL WATER WORKS.

The area included in the limits administered by the city corporation is about 6,000 acres, containing a population of about 270,000 souls, not counting any of the large suburban municipalities which are not separated from the city by any natural mark but form part of the city, and would bring, if annexed to the city, as they soon must be, the population to 350,000 souls.

The water supply of the city, with the exception of St. Denis ward, is under the control of the municipal administration, who own the aqueduct and impose a rate for payment. St. Denis ward and the suburbs

are supplied from a private company, the Montreal Water and Power Company.

As for all ancient cities, the aqueduct of Montreal had a very modest beginning. Towards 1800 the water from springs was diverted from Mount Royal and distributed through some of the streets of the city in wooden pipes. In 1815 this precarious supply was replaced by a system of distribution of water pumped from the river and raised into tanks containing 240,000 gallons. In 1854 the city bought this system from a private company, after which an epoch of progress began by the construction of a reservoir containing three million gallons and situated at that time outside of the city, at a place called "Cote a Baron." This reservoir now abandoned, has been turned into a fountain for ornament in one of the squares of the city (St. Louis square).

The time had now arrived when the water intake in the river, in the middle of the port, and consequently exposed to all sorts of pollutions, could no more be used with hygienic safety to supply a city full of future promise and anxious for the health of its inhabitants. Since 1847 it had been proposed to take water at the Lachine rapids, above the city, and to make use of these rapids to raise the water, but this scheme and others similar were not considered until 1853, when the city council concluded to confer upon Mr. T. C. Keefer, civil engineer, the duty of studying the plans for an aqueduct able to supply 5,000,000 gallons daily. The study of this project, its examination by consulting engineers, etc., brought the beginning of its execution to the year 1853, and its termination to the year 1854.

The system then established included an open canal four and three-quarters miles long, having its entrance about one mile above the Lachine rapids, at an elevation of 37 feet above the level in the harbor of Montreal. The dimensions of the canal were 40 feet wide at the water surface and 8 feet deep. This canal, throughout most of its course, is actually used to supply the city at present.

At the time of its construction this canal supplied more than sufficient water to develop a hydraulic force of 300 horse power and raise 200 feet above the level of the water in the harbor, 5,000,000 gallons of water, being at the rate of 40 gallons per capita for a population double what it was then (60,000). At the end of that canal were situated the settling basin and the wheel house, about as they stand this day. The hydraulic motive power was utilized by two breast wheels working six pumps to raise the water to a reservoir situated on the slope of Mount Royal, along McTavish street, forming the present low level reservoir, which is but an enlargement of the original one. That reservoir had then a capacity of 15,000,000 gallons.

The whole of this system had been well devised for the quality and quantity of water necessary for a limited future, sufficient in fact for a population double of what it was then, but the rapid increase of population, which has nearly quintupled since, and the inconveniences produced by the severity of our winters on the wheels have necessarily obliged the

authorities of the water works to substitute turbines for breast wheels, and also to construct an auxiliary steam plant, with a view of replacing hydraulic power during the low water level times, in a summer and during the winter on account of ice, frasil, etc. The steam plant was also found to be necessary to provide for the insufficiency of the hydraulic force, when the consumption of the water of the city exceeded that for which provision had been made when the canal was constructed.

Meanwhile the population of the city was increasing and was extending itself upon the heights situated east of Mount Royal at an altitude too high to be supplied by the system whose summit was at the McTavish reservoir.

This state of things necessitated the establishment of the present high level system, that is the construction of the reservoir at midway on the mountain slope, and of a pumping station to carry the water from the low level system to the high level distributing service, to a height of 422 feet above the level of water in the harbor. A Worthington steam pump, with a capacity of one-half million gallons was then sufficient to supply the high level system.

In 1878 the low level reservoir (McTavish) becoming insufficient, was enlarged so as to bring its capacity to 37 million gallons. In 1889 the population fed by the high level system had increased so much that a new steam pump of two and one-half million gallons had to be provided for this district.

As the changes were being made to the low level machinery, as mentioned above, several schemes were prepared to place the aqueduct in a way to satisfy the wants of the rapidly increasing population without necessitating the resort to the expensive use of steam. These schemes had in view two objects: the increase of hydraulic power or the supply of water by gravitation. Montreal is not advantageously situated to make use of this last scheme. Built upon an island bordered on one side by the St. Lawrence river, whose width excludes an idea of viaduct or syphon to bring water supply on this side; on the other side it is bordered by a branch of the Ottawa river and adjacent to another island formed by the same river dividing itself into two branches, not so wide as the St. Lawrence river, but of sufficient width to make very expensive the bringing across of a gravitation aqueduct.

To avoid these financial difficulties, nothing was left but to find north of the city a water supply taken at a sufficient altitude, that is more than 425 feet above the St. Lawrence to be adequate to the actual and future wants of the city. The ridge of the Laurentian mountains whose first summit is situated at more than 30 miles from Montreal, was the only spot where a water supply could be found. Explorations and levels were made and established the fact that a water supply could be taken from Lake Ouareau, situated at an altitude of 450 feet and at a distance of about sixty miles from Montreal. But the resumed cost of such an undertaking prevented the further study of it. Consideration of the gravitation plan was consequently superseded by the study of a sufficient hydraulic power system.

In furtherance of this plan, viz.: the extension of the hydraulic plant nature provides for it the head and the volume of water which are necessary; it only remains to utilize these elements for the needs; this is comprised in the plan which the author submitted to the Water Committee in his report of 27th of February last.

This project has been fully studied by many of the superintendents who have preceded the author, and he has done nothing but adopt the principles, only modifying the plans, particularly that one which relates to the bed of the aqueduct.

The plans recommended by the past superintendents all suggest the construction of a new aqueduct 130 feet wide at surface water, 78 feet wide at bottom and 14 feet deep, independent of that which is now in existence, and that the said aqueduct must be maintained for the supply of water during the period of construction, which cannot be estimated at less than three years.

The plan studied by the author and thought out with the help of his assistant, deals with the bed of the existing aqueduct, which will be simply enlarged and deepened, thus avoiding the purchase at the high values of the present time of the land necessary for a new aqueduct. In order to secure the water necessary for the food of the city during the progress of the work, he has provided for the construction of a covered conduit at the side which will supply the water to the pumps during this time, and which, extended to the middle of the River St. Lawrence, will furnish the city good water, purer than that which we now get from the north bank, where it is more or less polluted by the drainage from the riverside lands.

This plan can be carried out for the sum of two million dollars, the interest upon which will be secured by the saving realized over the present system of pumping, and the capital of which the author, as he has shown in his mentioned report, can be repaid in less than fifty years.

The author has the firm belief that a comprehensive plan should at least be studied with care by the aldermen, and as speedily as possible, in order not to be compelled to avoid it by constant new additions to the machinery, or by making terms with a private company and thus losing a part, or perhaps the whole of the control of one of the most important services of the city.

The necessity of the absolute control of the public services is so evident that the larger number of municipalities on this continent as well as the other, are striving not only not to let slip the control they have, but to recover as much as possible any that, by mistake, they have allowed to escape.

DESCRIPTION OF THE WATER WORKS—AQUEDUCT.

As already said, the present source of water supply for the city, is the St. Lawrence river, from which the aqueduct has its entrance one and one-half miles above Lachine rapids, 38 feet above the level of water in the port.

The present aqueduct, from the entrance to the junction of the old aqueduct, has a mean width of 104 feet, and a depth of 14 feet, 4,800 feet

long; it is then continued by the old aqueduct, which has a mean width of 30 feet, 8 feet deep and 26,200 feet long. The fall is 5 inches per mile.

The aqueduct ends at a settling basin of a capacity of 1,064,885 cubic feet, used for the distribution of the motive power to the hydraulic engines and for the drawing of the water supplying the city.

At the mouth of the aqueduct, a pier about 1,000 feet long has been built for the purpose of slackening the water and current of the river. Sluice gates, situated at the mouth, and 2 dams with movable gates, situated in the canal, regularize the level thereof; 18 bridges cross the canal and afford the means of circulating on the roads which connect the several portions of the riverside properties.

LOW LEVEL PUMPING STATION.

The water is raised by means of two systems: by hydraulic machines to the extent of about 60 per cent. of the consumption, and by steam engines for the balance.

The structures connected with the low level pumping station are composed of several buildings, of which there are three principal ones; the first contains the turbines operated by the aqueduct water itself, and the system of which comprises four sets of pumps, viz.:

No. 1. A "Jonval" turbine, with two double-acting pumps, which can pump 4,000,000 gallons per 24 hours.

No. 2. A "Samson" horizontal double wheel, with two double-acting pumps and an air reservoir, which can pump 5,000,000 gallons per 24 hours.

No. 3. A "Jonval" turbine, with three double-acting pumps and two air reservoirs, which can pump 3,000,000 gallons per 24 hours.

No 4. A "Jonval" turbine, with two double-acting pumps and an air reservoir; capacity 3,000,000 gallons per 24 hours.

The overflow of the settling basin and the water operating the hydraulic machines fall into a waste weir, below the building, and after a course of about 3,500 feet, flow into the St. Lawrence river, opposite the down stream point of the Nuns' Island.

The second building contains the steam engines, the system of which comprises three sets of pumps, viz.:

No. 1. A high duty "Worthington" engine of a capacity of 10,000,000 gallons per 24 hours.

No. 2. A high duty "Worthington" engine of a capacity of 10,000,000 gallons per 24 hours.

No. 3. A high duty "Worthington" engine (duplex) of a capacity of 8,000,000 gallons per 24 hours.

The third building contains the steam generators, which are composed of two sets of three Heine boilers, and a set of three Lancashire boilers.

The other buildings are used as sheds for the storage of coal and supplies, machine shops and employees' dwellings.

From the pumping station the water is forced into the low level reservoir and into the services by two mains of 30-inch diameter, having

together a length of 16,102 feet, and by two 24-inch mains having a total length of 27,709 feet.

One of the 30-inch mains is still unfinished and only branched upon the other of the same diameter, after their passage under the Lachine canal.

The other 30-inch main does not extend as far as the reservoir; at the intersection of McGill College avenue and Sherbrooke street it is connected with the two 24-inch mains which alone go as far as the reservoir; from that point the said 30-inch main extends on Sherbrooke street as far as Delorimier avenue near the eastern limits of the city.

LOW LEVEL RESERVOIR.

The pumps at the low level station raise the water up to the main reservoir of the city situated at the angle of McTavish street and Carleton Road, at the altitude of 204 feet above the river and 165 feet above the intake basin of the low level pumping station.

It is divided into two equal parts by a masonry wall of the same nature as the perimeter walls.

The capacity is 37,000,000 gallons of water.

A building attached to said reservoir contains the valves and sluice gates regulating the distribution and the reserve of water for the section of the city supplied by the low pressure; said section comprising all that part of the city extending from the St. Lawrence river to the following limits (northwards): Sherbrooke, University, Prince-Arthur, Pine avenue, St. Lawrence, Duluth, Cadieux and Mount-Royal streets.

HIGH LEVEL PUMPING STATION.

A building erected on the land adjoining the above-mentioned reservoir contains the high level elevating machines which are composed of a system of two pumps operated by steam.

1. A high pressure Worthington pump (duplex) of 24-horse power and a capacity of one-half million gallons per 24 hours. (This pump is almost unfit for use.)

2. A high pressure Gilbert pump (compound system) of 250-horse power and of a capacity of two and one-half million gallons per 24 hours.

The increase in the population of the high level district still going on, and the necessity to ensure its supply against any uncertainty, led the author to have the city council provide for the installation of a pump of a capacity of five million gallons operated by electro power. When it is in operation, the old steam plant will be kept as a duplicate in case of emergency.

The steam is supplied by a sectional tubular boiler of the Caldwell high pressure type, 200-horse power fed by two American mechanical stokers.

Old boilers of the locomotive type of 120-horse power each are still used during the cleaning, or when accidents take place to the Caldwell boiler.

The pumps take the water in the low level reservoir and raise the same by a force main of 20-inch and 12-inch diameter and 1,674 feet long, passing through McTavish street, Pine avenue, Mt. Royal Park, and ending at the high level reservoir situated on the slope of the mountain, opposite Peel street, at the altitude of 434 feet above the river and 230 feet above the low level reservoir.

As above mentioned a new five million gallons electric pump is in course of erection at this pumping station. It will replace the very old steam plant, which will be completely overhauled and will be kept in good order in case of emergency.

HIGH LEVEL RESERVOIR.

This reservoir is built about in the same way as the low level reservoir. It is composed of only one compartment.

Its capacity is 1,750,000 gallons; it equilibrates the water supply and contains the reserve for the section of the city supplied by the high pressure.

The district so supplied comprises all that part of the city lying north of the limits above mentioned for the low pressure.

CANALIZATION.

In addition to the force mains raising the water into the reservoirs, the canalization of the city is composed of:

28,509	feet	cast	iron	mains	of	30	inch	diameter.
66,198	"	"	"	"	"	24	"	"
13,090	"	"	"	"	"	20	"	"
20,498	"	"	"	"	"	16	"	"
278,120	"	"	"	"	"	12	"	"
121,176	"	"	"	"	"	10	"	"
128,724	"	"	"	"	"	8	"	"
257,758	"	"	"	"	"	6	"	"
324,151	"	"	"	"	"	4	"	"
2,239	"	"	"	"	"	3	"	"
694	"	"	"	"	"	2	"	"
625	"	"	"	"	"	1½	"	"
Total, 1,241,782								

The distribution of water by these mains is regulated by means of 3,082 valves of various diameters.

These mains supply 1,772 public hydrants and 58 private ones.

They are all laid underground, in cuts, with the exception of a portion of the 24-inch force mains, which are contained in an underground gallery on a distance of about 120 feet, from the Carlton Road crossing to low level reservoir.

The water is distributed to the ordinary consumers by free cocks, and to manufactureres, etc., by meters.

In order to complete the description of the system, I will mention the central shops and stores, situated at the corner of St. Chs. Borromee and Lagauchetiere streets, in the center of the city and the secondary shops on Cadieux, Grand Trunk and Desery streets, which provide for the wants of the service in the distant wards.

THE PRESIDENT: We also have a paper prepared by Mr. Chausse, Chief of the Bureau of Building Inspection of the City of Montreal, on "Building Regulations." There is not any necessity of my introducing Mr. Chausse to you. He is a gentleman who is well and favorably known to us all.

I have much pleasure in calling upon him to read his paper at this time.

MR. CHAUSSE: It is true, gentlemen, that I have prepared a paper which I have called "Our Sinful Extravagance, or the Need for Stricter Building Regulations." My voice is in very poor form today, and so I will ask you to let the matter stand over till this evening, say, when I propose to ask this convention to appoint a Special Committee on Fire Proofing and Fire Preventing.

THE PRESIDENT: At Mr. Chausse's request we will allow his paper to stand over, so that he may prepare what he wants to present to us.

That finishes our regular order of business for this morning, but perhaps there is some other business that might come before us.

MR. CHAUSSE: Mr. President, I would move that a special committee, called the Committee on Fire Protection, be appointed by the Society, and that this committee be composed of three members nominated by the President.

According to our Constitution and our general practice we have from time to time appointed special committees like this, and the result has always been beneficial, so far as I know. We need not make it a permanent committee until we see whether the results warrant it. I think that it would be a good thing to give it a trial.

This motion being duly seconded, was agreed to.

MR. SAUNDERSON: I would like to ask what is the deteriorating effect of sprinkling asphalt pavement, if there is any, or what are the disadvantages?

MR. REIMER: Does the gentleman mean the deteriorating effect to the pavement itself, or does he refer to the effect that the water has on the traffic, and the difficulty of getting over the street?

MR. SAUNDERSON: I mean the effect it has on the material itself.

MR. RUST: I think that it has been proved by experience that water has a very detrimental effect upon asphalt pavements; that is that water is very detrimental to the life of Trinidad asphalt pavements.

We can all remember some few years ago when we started to lay asphalt pavements, the asphalt was laid from curb to curb, and we found that the first part of the pavement to rot was the gutter. This, of course, has been lately overcome by the use of concrete or brick for the gutters.

I do not think that the California asphalts, or the Bermudez asphalts are affected in the same way, or to the same extent that the Trinidad asphalt is.

We found that the best way to clean those pavements was to flush them with water thoroughly. I may say that we do not always do this, on account of the cost, but, we find that that is the most satisfactory way to do the work.

We had been in the habit of keeping the asphalt on some of our principal streets constantly wet. I was opposed to this very much, but the board thought that it was a pretty good thing. They said: "Well, it keeps down the dust, and does not do the pavement any harm, and after all, that is what we want." They did not think of the cost in any manner—I mean the cost of renewing those pavements in a good deal shorter time than they would have to do if they kept them dry.

Then, there is another question, and that is that when an asphalt pavement is wet it is very slippery and dangerous, especially to bicyclists, and in a somewhat lesser extent to horses and pedestrians. Of course that is an important point, but not so important as the other, from one point of view.

I think the engineer from the City of Winnipeg, Mr. Ruttan, has about as much experience upon this subject as anyone I know,

and he ought to be able to tell us something about the injury that water does to asphalt.

THE PRESIDENT: Perhaps Mr. Fisher has some data.

MR. FISHER: I thoroughly agree with what has been said by Mr. Rust. We have some fifty-one miles of streets paved with asphalt, about forty of which is Trinidad and the balance the rock asphalt. We find that the water does not have such a deleterious effect upon the rock asphalt as it does upon the Trinidad. We also find that the gutters are the first places to rot, and that they will rot very soon, in fact while the center of the road is still in very good condition.

We have a pavement in our city twenty-one years old and it is in good condition (except for the matter of a few cracks) apart from the gutters. Those gutters have been replaced once, and since then they have deteriorated somewhat, still, the remaining portion of the street is in good condition, and bids fair to last for five or ten years more.

THE PRESIDENT: Was it in your city that a special account was kept two or three years ago showing the gutter as distinguished from the rest of the street? I have an idea that I heard of such a record being kept, and thought it might possibly be in your city.

MR. FISHER: No, sir, it was not in our city. It seems to me that I have heard of such a thing somewhere, but I do not remember just where I heard it, or what place it was.

THE PRESIDENT: I think they found that those three feet of gutter cost about double the cost of the rest of the street, for repairs.

MR. FISHER: We did keep a record of he cost of each street, but it was not in the form you mention.

THE PRESIDENT: I believe this was a special account kept for the purpose of getting some data as to the cost of the gutters compared with the rest of the street.

I suppose all the members are familiar with the fact that several years ago Washington, D. C., found that the gutters were wearing away much more rapidly than the rest of the street, owing to the

action of water on the asphalt, and that they replaced the asphalt with brick for the gutters.

We were to have a paper by Mr. Dow, of Washington, on this subject, but I am sorry that he has not found it possible to be here. Nor have we received his paper. I hope, however, that we will receive it in time to incorporate it with the rest of the papers in the Proceedings.

MR. FISHER: Perhaps Mr. Tillson could add something to what has been said?

MR. TILLSON: I think that Mr. Rust has said about all that there is to be said on the subject. As to the question whether or not water has a deleterious effect upon asphalt, I should say that it depends altogether upon the kind of asphalt you have reference to. It is a well known fact that Trinidad asphalt will be more acted upon by water than will any other kind.

In Brooklyn we do not think it is necessary to lay a special gutter for an asphalt pavement. The feeling there is so strong against it, that where a street has been ordered curbed and guttered previously with some other material, the property owners have wanted us to take up the other gutter and lay one of asphalt instead.

Then the question of the grade of the street is going to make a difference. I do not think that water will do asphalt any harm if it simply flows over it. It is the standing water that does the damage. There is also another factor, and that is whether they keep the street clean or not, because if the street is not kept clean, whatever is on the pavement will collect the water and keep it damp.

As a matter of fact it is nearly always in the gutters that you will find the water standing, and you will also find that portions of the street are always covered with water if the street is sprinkled frequently. I may tell you that in Brooklyn none or the asphalt streets are sprinkled, except in a few cases where it is done by the property owners.

The first case that I knew of where asphalt was injured by dampness rather than by water (and this has made me feel all the more certain in my opinion on the matter) was in Omaha, Neb. In this case there were no surface water sewers, and all the water

had to be carried across the intersecting streets. One gutter was paved with asphalt and then kept covered, and practically damp all the time. Three or four years after that street was paved the cover of this gutter was taken off, and the asphalt pavement underneath was found to be entirely disintegrated. You could take the asphalt and crumble it up between your fingers, while the asphalt that had been exposed to the air and kept reasonably dry, was in good condition and remained so for fifteen years afterwards.

All this enables me to say in answer to Mr. Saunderson's question that if a street is kept clean, with reasonable care sprinkling will not do any material harm, but, if the street is dirty, and if the gutters are dirty, or if the grade of the street is such that the water from the sprinkling is liable to stand on the street, then it will materially damage it.

MR. SAUNDERSON: I value this information very much, gentlemen, and thank you sincerely for it.

MR. SHERRERD: I would like to ask that the Society increase the salary of the Secretary. When the Association was first formed there was very little money in the treasury, but now that we are on our feet we ought to be able to do better by our Secretary than we were at that time. If it is in order I will make a motion to that effect.

THE PRESIDENT: We intended to spring that as a sort of a surprise upon the Secretary, but if Mr. Sherrerd wishes to present the motion now, why it will be all the same.

MR. SHERRERD: I did not know that the matter was under consideration, and thought that I would bring it before the meeting. Of course if the matter is being considered, I am quite willing to leave it in your hands. I know that it will be properly dealt with.

THE PRESIDENT: Is there any other business that should come before us at this time?

If not, I will declare this session adjourned, to meet again this evening at 8 o'clock.

The session thereafter adjourned.

FIFTH SESSION.

The meeting was called to order at 8:10 P. M., Thursday, September 7th. The President, Mr. Folwell, in the chair. He said:

The first order of business this evening is the report of the Committee on Water Works and Water Supply. Mr. D. W. Mead is chairman of this committee, but I do not think he is here, and I have not received his report, so I think we had better let it stand and pass on to the next item, which is a very interesting paper on the "Purification of Water by Copper Sulphate," by Mr. Daniel D. Jackson. Mr. Jackson has not found it possible to be here to read the paper personally, but I think it would be as well to ask the Secretary to read it. I understand that it is a very interesting paper on a very interesting subject.

The Secretary read Mr. Jackson's paper, as follows:

PURIFICATION OF WATER BY COPPER SULPHATE.

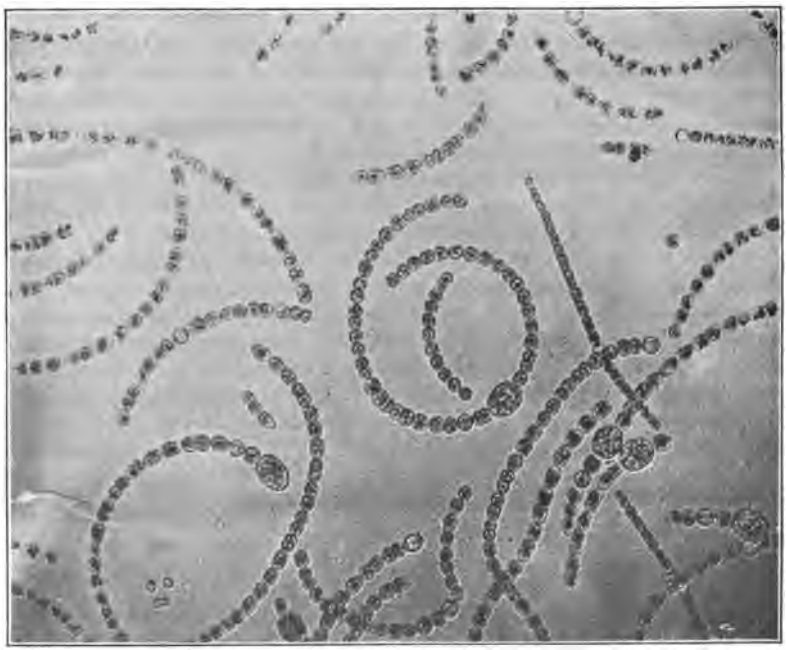
BY DANIEL D. JACKSON, NEW YORK CITY.

Bacteriologist Department of Water Supply, Gas and Electricity.

A wide interest has been aroused in the subject of copper sulphate treatment since the publication on May 7th, 1904, of Bulletin No. 64, by Moore and Kellerman of the Bureau of Plant Industry, United States Department of Agriculture. In this Bulletin entitled, "A Method of Destroying or Preventing the Growth of Algae and Certain Pathogenic Bacteria in Water Supplies," the authors showed that growths of odor-producing organisims in water could be easily destroyed by means of copper sulphate in quantities so small as to have absolutely no physiological effect, even if the copper used should entirely remain in the water supply. They also showed that all or nearly all of this copper is precipitated together with the microscopic growths to the bottom of the reservoirs so treated.

The first experiments of the writer on the treatment of water with copper sulphate were made upon Baiseley's pond, Jamaica, L. I., on September 6th, 1904. As all of the water used from it is subsequently filtered, it was considered that there could be no possibility of the presence of copper sulphate after filtration, as this chemical does not remain in solution in the water, but is immediately precipitated by the carbonates present. At the time of treatment the pond contained a considerable growth of anabaena. On account of its gelatinous nature this organism was giving great trouble in the mechanical filters and had at times caused a reduction of as high as 25 per cent. in the rate of filtration.

The accompanying illustration gives a magnification of this growth 285 times and shows how it is able in large numbers to clog up the surface of a filter.



ANABAENA CIRCINALIS.

The treatment of Baisley's pond was made as usual by rowing back and forth over the surface in a rowboat and dragging on each side of the boat a bag containing the copper sulphate. This chemical dissolves in the water with just about the proper rapidity to allow a boat to be rowed at an ordinary rate, and the solution spreads out and sinks, thus coming in contact with practically all the water in the pond.

The following table gives the results obtained:

REDUCTION OF ALGAE IN BAISLEY'S POND DUE TO COPPER SULPHATE TREATMENT.

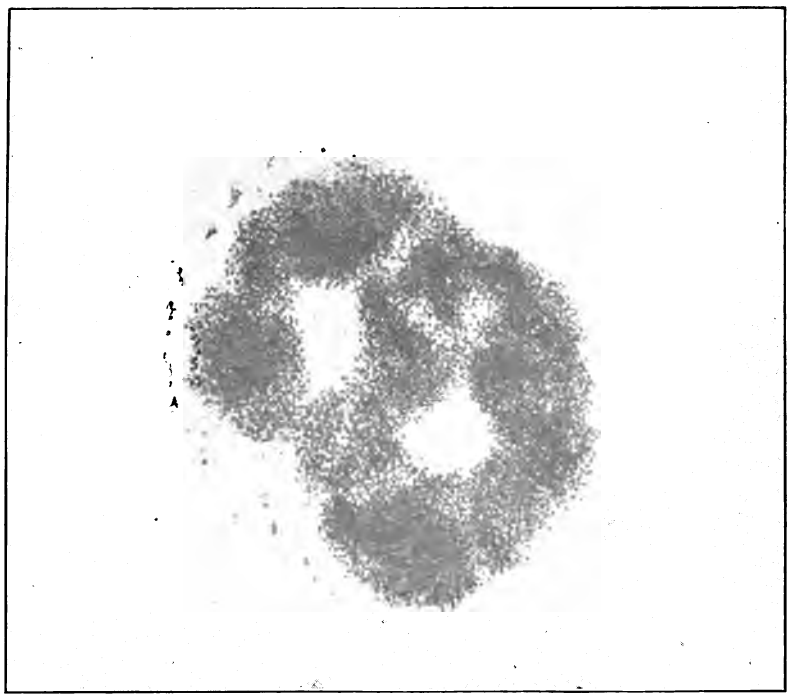
Date, 1904.	Location.			Total Organisms.	Anabena.
Sept. 6,	Top	before	treatment.....	1,640	800
" 6,	Bottom	"	"	435	265
" 7,	Top	after	"	155	55
" 7,	Bottom	"	"	235	0
" 8,	Top	"	"	105	0
" 8,	Bottom	"	"	150	0
" 9,	Top	"	"	125	0
" 9,	Bottom	"	"	125	0
" 10,	Top	"	"	175	0
" 10.	Bottom	"	"	105	0
" 30,	Top	"	"	140	0
" 30,	Bottom	"	"	100	0

It will be seen from the above figures that the treatment was highly successful, and that on the second day the total microscopic growth was greatly reduced, while the organism which caused the trouble was completely removed. The amount of copper sulphate used was approximately equal to one (1) part in eight (8) million parts of water, and the expense of treatment for 100,000,000 gallons was $7.50.

On the third day after treatment the wash water of the filter was reduced to three (3) per cent, causing a saving in the yield of the plant for that item of one million gallons per day.

Through the kindness of Commissioner Kennedy and Superintendent Zartman of the Department of Parks of Brooklyn, copper sulphate experiments were next made on an extremely heavy growth of Clathrocytis, an organism closely related to Anabaena, and one which is often found in large quantities in surface waters. This microscopic growth occurred in the Prospect Park duck pond, near Flatbush avenue, Brooklyn, in such enormous amounts as to entirely cover the surface of the pond with a thick green slime.

The illustration below is a photomicrograph of the organism magnified 175 times.



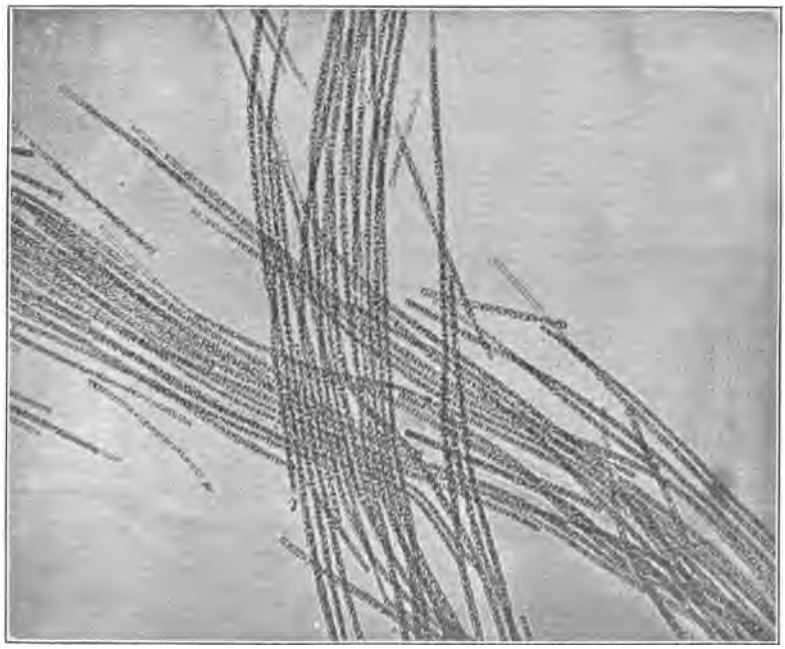
CLATHROCYTIS AERUGINOSA.

The following table gives the results obtained by the treatment of this organism.

REDUCTION OF ALGAE IN PROSPECT PARK DUCK POND DUE TO COPPER SULPHATE TREATMENT.

Date.	Location.		Units of Clathrocytis.
Sept. 9,	Top	before treatment	700,000
" 9,	Bottom	" "	10,000
" 10,	Top	after "	620,000
" 10,	Bottom	" "	83,000
" 11,	Top	" "	94,000
" 11,	Bottom	" "	35,000
" 12,	Top	" "	7,625
" 12,	Bottom	" "	2,550
" 13,	Top	" "	560
" 13,	Bottom	" "	640

The amount of chemical used was approximately one (1) part in four (4) million parts of water, and the cost of treating the pond was $2. On the second day after treatment the microscopic growth had been greatly reduced, and that which remained appeared to be dead. On the third day the pond was perfectly clear and the microscopic growth reduced to such



APHANIZOMENON FLOS-AQUAE.

an extent as to be unobjectionable. During the present summer this treatment has been extensively used in the Brooklyn Department of Parks and has been found to effectually remove the disagreeable odor and unsightly appearance occurring so often in the park ponds, and in the dilutions used there has not been the slightest injury to shrubbery or fish.

During the month of September, 1904, a considerable growth of an alga known as Aphanizomenon occurred in one of the sources of water supply for the Borough of Manhattan and its presence was the cause of a considerable taste and odor in the water.

A photomicrograph of this organism, magnified 285 times, is given above:

On Friday, September 30th, the surface of this reservoir was treated with copper sulphate in the proportion of one (1) part to eight (8) million parts of water. This amount of copper sulphate, providing it all remained in the water, would necessitate an individual to drink one hundred gallons of water a day to get the slightest physiological effect from the copper, and there is, therefore, no question about the safety of such a treatment as this, especially as only one or two treatments a year are necessary.

The following table gives the results obtained:

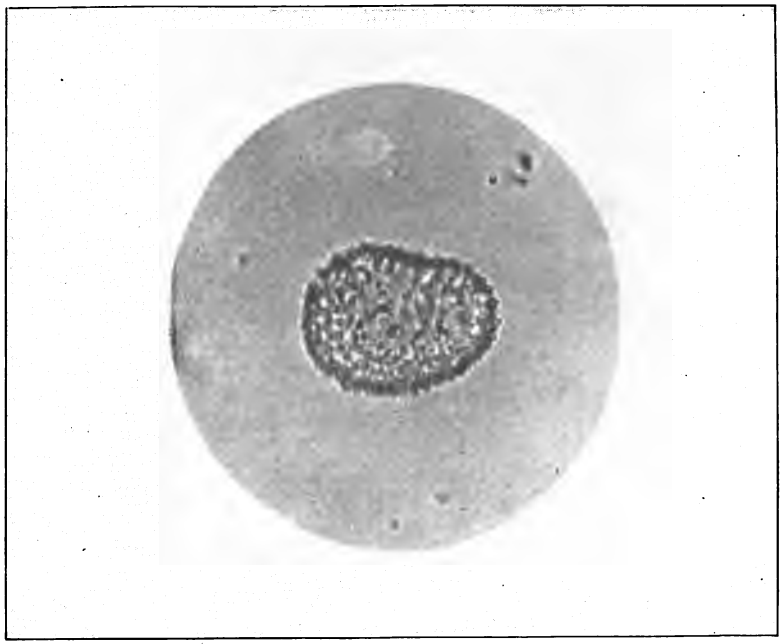
REDUCTION OF ALGAE DUE TO COPPER SULPHATE TREATMENT.

Date.	Location.		Total Organisms.	Aphanizomenon.
Sept. 30,	Top	before treatment.....	4,680	4,100
" 30,	Bottom	" "	4,115	3,725
Oct. 1,	Top	after "	1,020	755
" 1,	Bottom	" "	565	285
" 2,	Top	" "	490	240
" 3,	Top	" "	140	0
" 3,	Bottom	" "	275	0

The figures of the above table show that this form of blue-green alga was completely removed on the third day after treatment. From that time on the water has been clear and free from unpleasant odors.

Later in the year the microscopic organism uroglena occurred in large numbers in one of the Brooklyn supply ponds. This organism produced a strong fishy taste and odor in the water, and considerable numbers were being transported to the Ridgewood and Mt. Prospect distributing reservoirs. In order to prevent any further influx into the reservoirs of this odor-producing organism, the pond was shut off and a treatment with copper sulphate was made on November 23, 1904. As this is an extremely delicate organism, a dilution was used of only one (1) part of copper sulphate to twenty (20) milion parts of water.

The illustration below is photographed of this organism taken through the microscope and magnified 125 times:



UROGLENA AMERICANA.

The following table gives the remarkable results obtained:

REDUCTION OF UROGLENA DUE TO COPPER SULPHATE TREATMENT.

Date.	Uroglena (Units per cc.)
Nov. 23, before treatment	1,100
" 25, two days after treatment	450
" 27, four " " "	0

The figures show that the fourth day after treatment no trace of the organism remained. During the present year no trouble has been experienced from microscopic growths in this pond.

In the spring of the present year one of the Brooklyn sources of supply was treated with copper in order to remove a growth of asterionella. It was found that one part of copper sulphate in three million parts of water was necessary. The following table shows the results obtained:

REDUCTION OF ASTERIONELLA DUE TO COPPER SULPHATE TREATMENT.

Date.	Asterionella.
May 2, before treatment	2,850
" 3, " "	3,400
" 4, " "	3,650

Date.	Asterionella.
May 5, after treatment	2,450
" 6, " "	2,350
" 7, " "	2,200
" 8, " "	1,275
" 9, " "	875
" 10, " "	640
" 11, " "	550
" 12, " "	380
" 13, " "	310
" 14, " "	260
" 15, " "	200
" 22, " "	25

It will be seen from the above figures that not only does asterionella require more copper for its removal, but the reduction in the organisms appears to take place much more slowly.

AMOUNT OF COPPER NECESSARY FOR TREATMENT.

The amount of copper required to remove a growth of micro-organisms from water depends to a large extent upon the structure of the particular organisms present. A definite amount of copper is required each time the treatment of any particular genus is made, excepting when the growth is extremely heavy, when it may be even necessary to double the quantity. In general the amounts of copper so far found to be required are as follows:

DIATOMACEAE.

Asterionella	3,000,000
Melosira	3,000,000
Synedra	3,000,000
Fragilaria	4,000,000

CYANOPHYCEAE.

Coelosphaerium	4,000,000
Oscillaria	5,000,000
Microcystis	6,000,000
Anabaena	8,000,000
Aphanizomenon	8,000,000
Clathrocystis	8,000,000

CHLOROPHYCEAE.

Draparnaldia	3,000,000
Scenedesmus	3,000,000
Conferva	3,000,000
Raphidium	3,000,000
Closterium	3,000,000

Volvox	4,000,000
Spirogyra	5,000,000
Hydrodictyon	10,000,000

PROTOZOA.

Chlamydomonas	2,000,000
Cryptomonas	2,000,000
Euglina	2,000,000
Glenodinium	2,000,000
Peridinium	2,000,000
Mallomonas	2,000,000
Dinobryon	3,000,000
Synura	10,000,000
Uroglena	20,000,000

It will be seen from the results that if the nature of the growth is not known that a treatment of one part in two million parts of water will be sufficient to accomplish the work. If, however, the organism is known a much smaller amount may in most cases be used.

RECURRENCE OF GROWTH.

It sometimes happens that a short time after a pond has been treated, and the growth removed, a second growth will develop. This second growth may be the same organism as the first, or it may be an entirely different organism. The fact that a second or third growth sometimes develops is in no way remarkable when we consider that the copper added usually precipitates to the bottom in a few days and becomes inactive in the water above. If the conditions are favorable for a second development there is nothing but the reduction of spores to prevent its occurrence, but it has been noted that it is only in ponds or reservoirs highly contaminated with organic matter, and having large deposits of muck at the bottom, that such repeated growths do occur. In such cases if the ponds are not cleaned it may be necessary to treat them four or five times during the year. It has been claimed that a pond once treated with copper sulphate will require a stronger treatment for the second growth. This has not been the experience of the author.

INFLUENCE OF COPPER ON BACTERIA IN WATER.

When a heavy growth of algae is destroyed by treatment with copper, the dead organisms furnish food for the development of bacteria, and unless the algae are rapidly precipitated to the bottom of the pond, then with the fall in algae comes a marked rise in bacteria. Water bacteria require very strong solutions of copper to produce the slightest effect upon them. The following table shows the effect upon the common water bacteria produced by the treatment of copper (one part in 3,000,000 parts of water) in a reservoir containing asterionella:

1905.			Microscopic Organisms.	Bacteria.
March	13,	before treatment.....	4,625	405
"	14,	after "	3,645	600
"	15,	" "	3,325	6,000
"	16,	" "	1,925	11,000
"	17,	" "	1,850	12,000
"	18,	" "	1,575	45,000
"	20,	" "	1,350	100,000
"	21,	" "	900	440,000
"	22,	" "	350	630,000
"	23,	" "	350	310,000
"	24,	" "	400	107,000
"	25,	" "	360	80,000
"	26,	" "	300	64,000
"	27,	" "	270	50,000
"	28,	" "	150	37,000
"	29,	" "	100	20,000
"	30,	" "	100	8,000
"	31,	" "	60	3,500
April	1,	" "	25	860

EFFECT OF COPPER ON TYPHOID BACTERIA.

Experiments by the author show that the Baccilus Coli communis and the Bacillus Typhi abdominalis of the attenuation usually found in water are both destroyed by copper sulphate in the proportion of one part to two million parts of water. But these results are not obtained when fresh virulent typhoid germs are added to water. A strength of one part to 50,000 parts of water is then required.

In case of an epidemic, the latter strength is the only one which would be sure of accomplishing absolute disinfection, while the smaller amount would attenuate virulent typhoid or kill attempted typhoid. The strength of one to fifty thousand would give a noticeable taste and be likely to produce a physiological effect upon the consumer and is not to be recommended. It is probably that a treatment of such contaminated waters in a strength of one part in one million will sufficiently attenuate the typhoid germs so as to render them much less dangerous, and will at the same time be dilute enough to prevent any physiological effect upon the consumer. In solutions of double this strength a slight taste is noted, as has been pointed out by Weston.*

This is an added reason why it is not advisable to treat a water used for drinking purposes with amounts stronger than one part in one million parts of water.

1. The treatment of park ponds and water supply reservoirs with copper sulphate has now been demonstrated in hundreds of places through-

*Journal of the Massachusetts Association of Boards of Health, Vol. XIV, No. 3, August, 1904.

out the country to be a satisfactory and thoroughly practical method of removing green growths which produce an unsightly appearance or a disagreeable taste and odor.

2. The amounts required depend upon the structure of the organism present, and, to some extent, upon the amount of the growth. An extremely heavy growth may, in some cases, require double the amounts given in the table.

3. One part in two million is sufficient for the removal of all the objectionable growths, and if the genus is known, a much less quantity may usually be employed.

4. Virulent fresh typhoid requires one part of copper to 50,000 parts of water to kill the germs, but amounts greater than one part per million can be detected by taste in the water and if taken constantly would be likely to produce a physiological effect upon the consumer. In cases of epidemic from typhoid fever from water supply the disease bacteria may be greatly attenuated and rendered much less dangerous by treatment of one part of copper to one million parts of water.

MR. SHERRERD: I was asked to move that the matter of the exhibits at the next annual convention of this Society be placed in the hands of a committee of say three corporate and four associate members, the understanding being that when any question of importance arises the unanimous vote of the three corporate members against it would defeat it. The associate members ask for the extra representation only in order that they may have a working force.

It seems that under the arrangements here that the associate members had to pay quite a large sum for their space in the Association hall, of which the Society received but five per cent. They think that things could be so arranged that the expense to the associate members would be much less, and that the Society would get more benefit out of it.

I would therefore move that a committee be appointed to have charge of the Birmingham exhibition, and that this committee consist of three corporate members and four associate members; that there shall be no debts contracted by the committee in the name of the Association.

THE PRESIDENT: This matter has already been considered by the Executive Committee, and it was generally understood that the committee should have charge of the exhibition, and should contract no debts in the name of the Society.

Mr. Sherrerd's motion being duly seconded, was carried.

THE PRESIDENT: A temporary committee has already been appointed in an entirely informal manner. They had no idea that they were recognized by the Society as a committee. Perhaps it would be as well for the associate members to select their own representatives, and the Society can select the corporate members.

Three corporate members have already been appointed to act with the associate members on this temporary committee to which I have referred. I will therefore appoint those three members as the corporate members on the committee suggested by Mr. Sherrerd.

MR. SHERRERD: With reference to Mr. Jackson's paper, I would like to make one remark. The author has intimated that it is not advisable to depend upon copper treatment to remove pollution from water. There has been a tendency on the part of some advocates of the use of copper sulphate that it would be a very good thing to use on polluted waters. I understand, however, that the repeated treatment of the water with copper sulphate is apt to be dangerous to a community using the water.

I simply wished to make this statement so that it might accompany the paper in the proceedings. I want to emphasize the fact that no city should rely upon the copper treatment for the removal of pollution from the water. It has been said that it might be used in that way, but its legitimate use seems to be confined to the removal of algae and organisms of that nature.

THE PRESIDENT: I might say that from what I know of the subject it is not necessarily highly efficient in removing even algae. It kills them, but they stay on the bottom.

MR. SHERRERD: And when the treatment is discontinued I understand that they are likely to come back again.

THE PRESIDENT: And sometimes they do not settle on the bottom. I have know of one case where they were certainly killed, but they did not settle, but stuck all along the shore. I admit, however, that the fact that they settle along he shore prevents them from getting into the intake, but it gives the place a bad appearance.

I wish to announce to you that an oversight has been called to my attention. I stated that a committee had been appointed to take charge of the exhibits, but I did not nominate the committee. I will therefore appoint Messrs. Wm. S. Crandall, R. K. Davis, E. J. Snow and T. H. Blair as the associate members, and Messrs. Tillson, Sherrerd and Rust as the corporate members.

Our next business is to hear the report of the Committee on Sewerage and Sanitation. Mr. E. S. Rankin is the chairman of this committee, and if he is ready we would like to hear the report.

Mr. Rankin then presented the committee's report, which was as follows:

REPORT OF THE COMMITTEE ON SEWERAGE AND SANITATION.

A REVIEW OF THE ANTI-MOSQUITO CAMPAIGN, WITH SPECIAL REFERENCE TO THE WORK IN NEW JERSEY.

It had been the intention of the Committee on Sewerage and Sanitation to present at this Convention a general review of the sanitary work now being done in the United States and Canada, leaving the field open for papers on specific subjects to other members of the Society.

Among the papers which it was expected to present was one on mosquito extermination, by Dr. John B. Smith, State Entomologist of New Jersey, who has spent the larger part of his time for the past three years in the study of this subject and in the practical work of extermination. When it was found that Dr. Smith would be unable to attend the convention, it seemed to the chairman of the committee that the sunbject was of such importance and was exciting such widespread interest at the present time that a report dealing with this question alone might prove of more interest than the more general report at first intended.

The writer does not claim to be an expert on this subject, nor does this report contain any original ideas. For the information contained herein I desire particularly to express my indebtedness to Dr. Smith, and also to Mr. Henry Clay Weeks, Secretary of the National Mosquito Extermination Society.

Not more than four years ago the announcement of such a subject would probably have been greeted with a general smile of amusement, but since it has been established beyond question that yellow fever is carried by the Stegomyia and malaria by the Anopheles mosquito, and believed by most authorities that these diseases are transmitted only by this means, the seriousness of the subject is being recognized. The press almost universally is taking up the matter, extermination societies, both local and national are being formed, and boards of health, city and state legislatures are passing ordinances and laws, bearing on the subject.

It is not the purpose of the writer to go into any detailed description of the several varieties of mosquitoes or their habits further than to say that there are at present about five hundred known species, about forty of those are found in New Jersey. Many of these species are rare and cannot be considered as pests. Some are not even able to bite, but this failing is more than made up by other members of the family. A few important differences in their life habits may be noted, as for example, some species winter in the adult stage, others as larvae, and still others as eggs. Some habitually enter houses, others rarely, except by accident. Some never fly more than a few hundred feet, while others may be found in swarms ten, twenty or even fifty miles from their breeding places. This last mentioned point is important from the fact that while a given locality may be entirely free from local broods, it may at certain times be infested with swarms from other localities over which it has no control. This materially complicates the problem and makes it more than a local question. So far as is now known only two species are disease carriers.

However the different species may vary in their habits, in one very important feature they all agree; they all require standing water for one stage of their development. The proposition, therefore, resolves itself into this—get rid of standing water and there can be no mosquitoes. In other words, the solution of the problem lies in the filling or drainage of swamps and marshes and stagnant pools and the avoidance wherever possible of cisterns, rain barrels, cesspools, etc. Where these latter are a necessity they should be screened or oiled. Running water, except where the edges are very shallow and overgrown with grasses, and waters containing fish are not dangerous.

Notwithstanding the fact that the relation of malaria to mosquitoes had been suggested more than twenty years before and that in scattered localities at widely separated points petroleum had been successfully used to kill larvae, it was not until the publication of Dr. Howard's book on mosquitoes, in 1901, that the movement became in any way general, or that anything like a systematic attempt at practical extermination was undertaken.

At the present time the movement may be said to be world-wide. In the United States practical work is being done in New York, New Jersey, Massachusetts, Connecticut, Delaware, Maryland, Florida, Alabama, Louisiana, Texas and California. There may be other states from which I have no report. To mention a few specific instances, New York City has appropriated $17,000 for dealing with the salt marshes on Staten Island. Breeding places around Gravesend Bay are being filled with the city ashes and refuse. Very successful work has been done along the north shore of Long Island. The accompanying circular from the New York City health department is a good example of brief and concise rules for neighborhood work. It was published with special reference to the Sheepshead Bay movement and was distributed by the police throughout the whole district.

(Circular.)

DEPARTMENT OF HEALTH

CITY OF NEW YORK.

Resolutions of the Board of Health, New York City, in aid of Mosquito Extermination and the Prevention of Malarial Fever.

(In force from April 15, to October 15.)

1. No rain water barrel, cistern or other receptacle for rain water shall be maintained without being tightly screened by netting, or so absolutely covered that no mosquito can enter.

2. No cans, pails or anything capable of holding water, shall be thrown out or allowed to remain unburied on or about the premises.

3. Every uncovered cesspool or tank shall be kept in such condition that oil may be freely distributed and flow over the surface of the water. Covered cesspools must have covers perfectly tight and all openings screened.

4. No waste or other water shall be thrown out or allowed to stand on or near the premises.

☞ Information is requested of any standing water that the premises may be inspected and the legal remedies against same be applied.

The prompt co-operation of all persons in the enforcement of the above regulations is earnestly requested, and they are assured that in this way the breeding of mosquitoes on their premises will be prevented.

Mosquitoes are the only proven means of conveying malaria.

Any inquiries or complaints in relation to the above matter should be forwarded to

JOSEPH H. RAYMOND, M. D.,
Assistant Sanitary Superintendent,
Borough of Brooklyn,
38-40 Clinton Street.

HERMAN M. BIGGS, M. D., Medical Officer.

ERNST J. LEDERLE, Ph. D., President.

A somewhat more elaborate circular is published by the health department of Stamford, Conn., giving cuts of the ordinary and the malarial mosquito, with brief descriptions of the same, and rules for preventing breeding.

Along the shores of San Francisco Bay a settlement of the wealthier citizens was about to be abandoned on account of the swarms of mosquitoes. The marshes were drained and the pest practically eliminated.

The work in New Orleans is a matter of current history and need be no more than mentioned.

Special mention should also be made of the educational campaign being conducted by the National Mosquito Extermination Society, an association now in its third year of existence, composed of representative men, entomologists, physicians and engineers from all over the United States.

The work of the United States government at Havana was an object lesson to the world. How successful this work was is evidenced by the fact that in 1902 for the first time in two centuries the city was without a single case of yellow fever, and in the three years from 1900 to 1903, deaths from malaria were reduced from three hundred and twenty-five to forty-five. It is confidently expected that the similar work now being done in Panama and New Orleans will prove equally effective. Another remarkable instance of a successful crusade was at Ismailia on the Isthmus of Suez, where in one season's work cases of malaria were reduced from two thousand to two hundred. Among other governments which have interested themselves in the work may be mentioned Great Britain, Germany, Italy, and, of course, Japan. The Republic of Cuba is continuing the work begun by the United States. So far as I have been able to learn no active interest has yet been taken in the movement by the country, whose hospitality we are enjoying today, but perhaps among your other blessings you enjoy immunity from this pest.

The State of New Jersey has long been noted among her sister states as the chosen dwelling place of the mosquito. While this reputation is undeserved, other sections of the country suffering to a much greater extent, she certainly can claim the credit of being the pioneer in the movement toward their extermination. In 1902 the state legislature passed a law appropriating the sum of ten thousand (10,000) dollars for the study of the life habits of the insect and the devising of means for its extermination. On its introduction, the bill was looked upon as a joke and referred to the Committee on Agriculture with no thought, except among its few advocates, that it would ever be heard from again. However, after hard work on the part of the men back of it, it was finally passed. This $10,000 was spent in a thorough study of the subject by the state entomologist, and his report, a volume of four hundred and eighty-two pages, is now the text book for students of the question all over the country. A supplement to this act, passed the following year, gives to local boards of health authority to condemn as nuisances all mosquito breeding places and to compel the owners of such places to abate the nuisance. Still another act passed at the last session of the legislature provides for the investigation of breedings places, and recommendations for doing away with the same by the director of the State Agricultural Experiment Station on the request of the proper municipal authority; and in case such breeding places are found to be on salt marshes, for state aid in draining the same to the extent of twenty-five per cent. of the cost of the required work. The bill carries an appropriation of $16,000 to run over two years, $6,000 of which is for investigation and experiment and $10,000 for the state aid feature.

Among the first municipalities in the state to systematically take up the campaign was the village of South Orange. I cannot do better than to introduce at this point the circular issued by the Drainage Committee of the Village Improvement Society. It shows in the fewest possible words just what has been accomplished, and is also interesting as an educational exhibit.

(Circular.)

(Reprinted by Permission of Mr. Spencer Miller.)

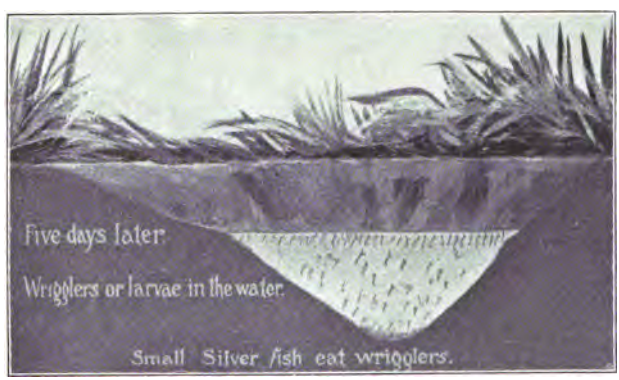
INFORMATION ABOUT MOSQUITOES.

ISSUED BY THE DRAINAGE COMMITTEE OF THE

VILLAGE IMPROVEMENT SOCIETY OF SOUTH ORANGE, N. J.

This mosquito has just laid from 150 to 400 eggs.

If the sun does not dry up this pool before ten days, or if no one fills the pool with earth nor drains it, or if oil is not put on the surface of the pool, then about 150 to 400 mosquitoes will be bred from this pool in about ten days. In cool weather mosquitoes breed less rapidly than in warm weather.



The eggs have become "wrigglers" or larvae. "Wrigglers" may be seen with the naked eye. The "wrigglers" at the bottom are feeding, those at the top are breathing.

Oil on the water would prevent the "wrigglers" from breathing and they would die in a few moments. The sun has evaporated half of the water. Without water the "wrigglers" would die. Mosquito larvae are scavengers; a foul pool breeds more than a clean one.

In about
five more days
Mosquitoes issuing
from the water
The nearer one lives to stagnant water the more the mosquitoes will annoy him

THE MOSQUITOES WIN.

The sun failed to evaporate the water. The pool was neither filled, drained nor oiled.

"Wrigglers" become pupae for at least two days before they became mosquitoes. Any receptacle holding water for ten days may breed mosquitoes; for example, barrels, tin cans, cesspools, culverts, manure pits, etc.

It will pay any one to abolish standing water near his home.

NOTE—The above illustration is a correct representation of the breeding of the commonest of our domestic mosquitoes, *(Culex pipiens)*. The story of one puddle is the story of a million puddles. The sun may usually be depended upon to dry up the great majority of such puddles before ten days elapse.

SOME FACTS ABOUT MOSQUITOES.

1. There are over 30 species of mosquitoes in this part of the United States.

2. Different species have different habits, as do different birds and fowl.

3. Some species are domestic—breeding in fresh water, flying short distances and habitually entering houses. Others are migratory, flying long distances, and almost never (except accidentally) entering houses. The latter are occasionally seen in South Orange. Most migratory mosquitoes breed in salt water marshes.

4. All mosquitoes breed in stagnant water and require from one to three weeks to transform from eggs to winged mosquitoes.

5. The common house mosquitoes *(Culex pipiens)* are the most abundant of domestic mosquitoes.

6. The Malarial mosquitoes *(Anopheles)* may breed in any sort of receptacle or puddle holding water, and are the most dangerous domestic

mosquitoes. They never travel far from their breeding place. Ross, an eminent authority, says 600 yards is about the limit.

7. Mosquitoes do not breed in the grass, but tall grass forms a favorite harboring place. A mosquito a day old is full grown—females three days old may lay eggs.

8. Salt marsh mosquitoes breed 4½ miles southeast and 5 miles east of South Orange; these were present about 10 days during 1903. About August 2nd to 5th with four days gentle east wind the marsh mosquitoes were very numerous in the fields and gardens for about five days. They were not noticed by most people because they did not seek to enter houses. They were also present July 5th to the 10th. The Newark and Elizabeth salt marshes are now being drained.

THE WORK OF THE DRAINAGE COMMITTEE.

1. In 1901 we oiled every stagnant pool in the village. The mosquitoes were so greatly reduced in numbers that we were satisfied that our supply was chiefly of local origin. It was especially noticeable that they were very scarce in houses in the fall. We expended about $1,000 during the season, but not a dollar for permanent improvement.

2. In 1902 we did some draining, filling of holes and oiling what stagnant water we could not abolish. The results were emphatic. We expended about $1,200—one-half of this sum was for permanent work.

3. In 1903 we abolished more than half the wet places in the village, while the Board of Health did the oiling. The eighteen days continuous rain fall in June and the twelve days rain fall in August produced abundance of mosquitoes in towns and villages where they are seldom seen. Towns normally mosquito-less had a pest in 1903. South Orange suffered like the others, but for a far shorter time than those towns where anti-mosquito measures were not taken. We expended about $1,500—mostly for permanent work.

4. In 1904 we hope to complete the work of draining, filling and cleaning up the remaining wet places in town.

Our sewer system will be in use during the year, and the work of filling up over 1,500 cesspools will begin. These cesspools have been generally oiled, but many have escaped attention. They are great breeders of domestic mosquitoes unless covered with oil.

Our village trustees are now awake to the importance of caring for our water-ways, and water from streets will not be allowed to pour into vacant lots to form breeding places.

The township authorities are keeping the East Branch of the Rahway River cleaned out to its proper depth. They should also keep all street gutters clean and free from standing water. Many property owners have done a great deal of draining on their own account and much more is promised.

5. If we have about $2,000 to spend and an average summer rain fall, we confidently predict a smaller supply of mosquitoes in South Orange than ever before.

6. We have every reason to expect West Orange, Orange and East

Orange to join in the movement in 1904. Vailsburg and Maplewood may also do something. Newark and Elizabeth have already begun drainage work on the salt marshes.

We desire a subscription from every householder in the village, however small it may be. This work is for the benefit of all, and all should support the movement.

The improved appearance of our village, resulting from our work, should entitle the committee to receive the support of the whole community.

Forward subscriptions to

MR. E. S. ALLEN, *Treasurer,*
Scotland Road, South Orange, N. J.

PHOTOGRAPHS FROM LIFE OF TWO KINDS OF DOMESTIC MOSQUITOES.

(About 3 Times Life Size.)

THE COMMON HOUSE MOSQUITO.

(Culex pipiens.)

Showing characteristic resting position on side wall. Wrigglers seen in rain barrels produce these.

These mosquitoes may be found hibernating in cellars in winter and may be breeding there if water is allowed to remain standing.

BY WM. L. UNDERWOOD.
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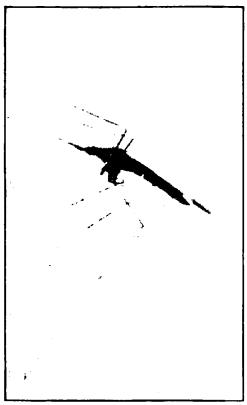


THE DANGEROUS MALARIAL MOSQUITO.

(Anopheles punctipennis.)

Note that this mosquito rests with body at an angle to the side wall—body and beak in a straight line.

If such be found anywhere in the village, report the fact at once to the Board of Health or to the committee.

copyrighted,
BY WM. L. UNDERWOOD.

THE DRAINAGE COMMITTEE OF THE
VILLAGE IMPROVEMENT SOCIETY OF SOUTH ORANGE,
SPENCER MILLER, *Chairman.*
E. S. ALLEN, *Secretary and Treas.*
E. V. CONNETT.
R. S. SINCLAIR.

The work is being continued on the same lines and several other municipalities are following their example.

In my own City of Newark the problem is much larger and more complicated in that we have had to deal with an area of some three thousand five hundred acres of salt marsh. These marshes breed in countless million the Sollicitans, a migratory species, and consequently furnish a large supply not only to our own city but to the adjoining towns. To still further complicate the situation there are in the vicinity forty thousand more acres over which we have no control, and hence concerted action by all the municipalities bordering thereon, not only in New Jersey, but also in New York becomes a necessity if satisfactory and permanent relief is to be obtained.

Newark has taken the lead through its board of health and by the expenditure of $5,000 especially appropriated by the common council for this purpose, has rid its entire meadow area of breeding places with the exception of about forty acres of particularly low-lying ground where it will be necessary to construct tide gates to lower the water level. Even this tract has been comparatively free during the season just passed.

The method employed was draining the meadows by means of narrow ditches about six inches wide and from two to two and one-half feet in depth dug at intervals of from sixty to one hundred feet apart. It is not to be understood that the entire area of three thousand five hundred acres was thus ditched, as on a large portion of this tract it was found unnecessary to do anything, but whenever breeding places were found this method was pursued and with marked success. In all some three hundred and sixty thousand lineal feet of ditches were dug. Assuming the entire appropriation to have been used in this work, the cost would be less than one and a half cents per lineal foot of ditch. Part of the work was done by hand and part by a machine known as the "True Ditcher." Where long ditches are required the machine work is cheaper, but for short ditches hand work was found more economical. As high as four thousand feet were cut in a single day with the machine. The ditches cut last season were found to be in good condition in the spring, and it has only required the services of one man during the present season to cover the entire area and keep everything in working order.

As has been stated above, while the results of this work have been most satisfactory, not a mosquito having been bred on the treated area during the present summer, we require the help of our neighbors in carrying on the good work. The City of Elizabeth, adjoining us on the south, has spent $1,000 in draining the salt marshes within its territory, and during the present summer has taken advantage of the state aid mentioned above, appropriated $2,000 more and received $500 from the state treasury. The appropriation by the City of New York for the Staten Island meadows above mentioned will also materially help us. Hundreds of scores of marsh land at Kearney are being filled by means of hydraulic dreges by private enterprise. Enormous increases in land valuation have followed the draining of about two thousand acres of lowlands along the Shrews-

bury river, thus proving the economic as well as the sanitary value of the work. Many other cities and towns throughout the state have taken up the question either officially or through local improvement societies.

I will not trespass longer on your time by detailing other work already completed or now going on in our state. Enough has been said to show the widespread interest that has been awakened. The mosquito is still with us but enough has been done to lead us to hope that the movement will continue until at least a material relief from present conditions is obtained.

I cannot better close than with a quotation from the introduction of Dr. Howard's work. If these words were true in 1901, how much more so in the light of what has since been accomplished: "With the knowledge which we now possess it seems almost incredible that people should all these years have suffered, more or less patiently, the tormenting bites of Culex and the insidious but more dangerous punctures of Anopheles without making the slightest effort to abate the nuisance and the danger."

THE PRESIDENT: The report of the committee is now open for discussion.

MR. HOWARD: I want first of all to fecilitate Mr. Rankine on his very able exposition of this most interesting subject. I have given the subject some attention, and have followed with care the manner in which New Orleans is dealing with the mosquito problem. I agree with Mr. Rankine when he says that the mosquito problem is one of the greatest in the country.

Now, I would like to ask a question and that is, what is the essential principle that retains the mosquitoes on the Newark meadows. Is it the circulation of free water, or the stagnation of ponds and things of that kind?

MR. RANKINE: There are two principles involved in this, and the way to get rid of them would be either to dig ditches and drain out those stagnant ponds, and also to drain all the standing water which accumulates during a rain; or to open out those ditches and allow the small fish to get into them. When there are small fish there are no mosquitoes.

MR. RUST: Do I understand Mr. Rankine to say that where there are small fish there are no mosquitoes? I may say at once that that is not our experience.

THE PRESIDENT: I think that Mr. Rankin meant that the

mosquitoes will not become mosquitoes at that particular spot where the small fish are. That is to say that the fish will eat them before they have developed into mosquitoes.

MR. RUST: We have lots of fish and lots of mosquitoes.

THE PRESIDENT: They may originate in pools where there are no fish.

MR. RUST: There are not any pools for them to originate in.

MR. RANKINE: The only way that I know that could happen would be that they would either originate in pools, or tanks, or barrels, or something of the kind where the fish could not get. There the larvae would develop.

MR. REIMER: I live right alondside of Mr. Rankin, so far as municipalities go, and a southeast wind sends the mosquitoes right up to us.

MR. RANKINE: They come from Staten Island.

MR. REIMER: I have no doubt they do. But there is something in the general view of mosquitoes that I have never been able to satisfy myself upon, and that is this, in the ordinary dry season they are very few, but if you have a rain for a little while you will see them in swarms. It seems as though every bush had been stocked with them, and that they were only waiting for the rain to bring them out. Is there any one who can give us any information as to what connection the rain has with them?

Before the rain everything is lovely, and there are not many mosquitoes, and they do not bother you to any extent, but two or three hours after the rain you come out of the house and they are so thick that you do not know where to go to get away from them. This condition of affairs lasts for two or three days and then they disappear again, and things are the same as they were before. This happens every time we have a shower of rain.

MR. EGGERS: I have been a citizen of Newark since 1858, and I have had considerable experience with mosquitoes. For the last twenty-four years I have lived at about the highest point in the City of Newark, and we were constantly bothered with mosquitoes.

Within the last two years I am glad to say that we have noticed that they are not so numerous.

This last season I have been able to sit in the piazza with my family almost every evening without being bothered by the mosquitoes. To tell the truth I do not think that there were more than two or three nights that we were troubled with them anything worth speaking of.

Another thing I might tell you is this. I have some blackberry bushes around my yard, and it was always a great trouble to go out and pick the berries, on account of the mosquitoes. This year, during the time that the blackberries were ripe we did not have that trouble at all. I was in the habit of going out myself and picking some of them, and I was not bothered with the mosquitoes.

I think you will agree with me that this is a sign that the mosquitoes are diminishing around Newark.

I understand that they have a lot of mosquitoes in the Oranges yet. I know that I have been through that part of the country several times, and I saw them building right along the edge of the meadows. That would not have been allowed in Newark. I tell you they are breeding mosquitoes very fast there.

MR. GROSSER: I am exceedingly glad that Mr. Eggers has spoken. What he has said has been information to me. He told us that for the past two years he has noticed that there are fewer mosquitoes than formerly. Now, I have been wondering where our mosquitoes come from (because we have about as many as we want, and a few to spare) and it was not till Mr. Eggers said that they have left him that I realize that they have all come across the lake to us.

A few years ago we in Chicago used to be able to sit on our verandas but we have not been able to do that lately. I am afraid that they got tired of New Jersey and are striking out West. In order to get rid of them in Chicago we use the old remedy—a slap.

MR. HAZLEHURST: Mr. Chairman, this paper has a peculiar interest for me. The gentlemen who have preceded me have all spoken along the line of the nuisance that the mosquito is. They have spoken of the Culex and the other varieties of mosquito, but

none of them have mentioned the worst of them all, the stygomia—the deadly yellow fever mosquito. We have this pest, and have had to deal with it.

The country has been particularly impressed with the lessons which have been taught in Cuba, and the experiments which have been made by the United States government, and we are working on those lines in my section. Today my town of Mobile, Alabama, is surrounded by yellow fever on all sides—Pensacola, Natchez, Vicksburg, New Orleans—all have the yellow fever.

Shortly after the outbreak in New Orleans there was a mass meeting called in Mobile, which was very largely attended, and they determined there to watch the mosquito, believing firmly in the theory that the stygomia family were the originators and propagators of the fever.

The organization that was formed that night undertook to finance a battle against the mosquito, and determined to raise the amount that was required, which was about fifteen thousand dollars. There was also a committee on education and an executive committee appointed. The citizens did me the honor of appointing me as superintendent of the Executive Committee.

It might be interesting to you gentlemen to know what fight we had made up to the time I left to attend this convention, and what success we have had.

Our city comprises about a hundred miles of streets. Its topography is very flat and low. The main difficulty with us is a want of drainage. We have only a few sewers in the town, and a great many of our outlying districts have only surface ditches, and these being cleaned out from time to time the loose loam soil has been thrown up aside, and in many cases the lots are higher than the street. So, after our heavy tropical rains whole sections are sometimes inundated, and a great many houses of the poorer classes, particularly, and in the negro quarters are surrounded by ponds of water which generally lie there till they evaporate.

The organization that was formed at that meeting has divided the city into eight districts, and a detail of police were appointed by the mayor, to be under my supervision. This detail consisted of

eight men, one for each section. Each of these men had an assistant, and it was their duty to make a house to house canvass and inspection, and report on the sanitary condition of the premises in general. and to mention specially anything in the way of water leaking from cisterns, or unsanitary plumbing in the houses. They also reported whether the lot had any water standing on it, and the amount of weeds that covered the ground, and whether they had grown to any height, as they do down there in a very short time.

Those men had instructions to correct any minor details that they came across, without reporting them. By minor details I mean such things as turning over cans that had stagnant water in them or turning over barrels, tubs or such things. The officer also had with them circulars we had printed for the purpose and he had to distribute them.

Knowing that this matter of the mosquito was coming up I brought one of those circulars with me. It is as follows:

"You are expected to help in the work.

Q. What work?

A. Destruction of mosquitoes.

Q. What is that for?

A. To protect every citizen and every occupant of Mobile, his life and health, business or employment, not to speak of the future prosperity of the city.

Q. How is that connected with mosquitoes?

A. Well, it is just this way: Yellow fever has a start in New Orleans. The authorities are doing everything in their power to keep any one from coming in here who may have a yellow fever in his blood. But, if notwithstanding the good quarantine system, such a person should come in here, yellow fever could not spread except for the domestic mosquito. This mosquito has to suck up the blood of a yellow fever patient, which blood contains the germ of yellow fever. After twelve days these germs have grown in the mosquito's poison sac, so that when it bites anyone it passes the yellow fever germ into the person's blood. So you see we must get to work and prevent this.

Q. How are we going to do it?

A. Well, let's all help make quarantine effective, and not leave all the detective work to the authorities, so we can send quarantine violators to a safe place at once. Let's cover all fever cases with mosquito bars till the doctor tells us what the disease is.

Let's kill the mosquitoes where they hatch; kill others wherever we can. In short, here are the

RULES FOR EXTERMINATION.

(Keep those rules where you can see them.)

1. Put fine netting over cisterns, wells and tanks of water required for every day use, and put layer of kerosene on surface of the water.

2. Dump all standing water that has collected on the premises in accidental receptacles, such as vases, barrels, tubs, stopped up roof gutters, etc.

3. Change often the water needed in barns, chicken coops, kennels, etc.

4. Drain or fill in all pools or hollows on premises likely to collect rain water.

5. If wrigglers are found to exist in water required for every day use, as in barrels, cisterns, etc., cover with a thin layer of petroleum or kerosene, half a tea cup to every fifteen feet of surface. If the odor of these oils is objectionable, oil of eucalyptus may be substituted where expense is immaterial. Note increase of malarial and other fevers two or three weeks after a rainy spell: mosquitoes are the cause.

6. Kill grown mosquitoes in dwellings by fumigating with sulphur, formaldehyde or pyrethrum (Persian insect powder). The Pyrethrum (insect powder) should be moistened into thick paste and dried in or under the stove. It will then burn and smoke without difficulty. The mosquitoes will be stupified and fall to the floor, when they may be easily swept up and destroyed. Burning pyrethrum powder out of doors will keep mosquitoes away from the immediate vicinity.

7. Remember you owe it to your neighbors as well as to yourself and family to prevent the breeding of mosquitoes on your premises. Examine your lot and house carefully at least once a week. If you find wrigglers in any water on the place you are raising a crop of mosquitoes that will be a source of annoyance and danger to the neighborhood.

THE AUXILIARY SANITARY ASSOCIATION OF MOBILE."

As you notice this pamphlet was written in a conversational style, just to give the people an idea of what they ought to do. It was distributed by the thousand, and the officer was directed to notify each tenant, or each inhabitant of the danger of having standing water on his premises, or leaks in the sewer service, or leaks in the water service, or high weeds. As soon as any reports were received they were turned over to the police chief, the superintendent of water works, or the superintendent of sanitary plumbing, and there were specific orders from the mayor that they should begin immediately to correct those defects.

Those eight men, for the sections had five laborers with them, and one cart, and they were supplied with oil and lime, and they

were given general directions to go to the houses that had been reported by the officers, and to correct the trouble that had been reported.

In many instances it became necessary to drain the ditches to get rid of the water under the house.

We adopted a pretty large and broad plan in cutting the weeds. We started three two-horse mowing machines and they worked in the lots where the weeds were growing high, and where the tenants were poor and could not cut the weeds themselves. We thought it better to do the work ourselves than waste the time trying to force them to do it.

We cut from eighty to one hundred acres of weeds with those three machines and five men with scythes, for use where the machines could not go, and so on.

While it is true that probably the weeds have not any effect upon the mosquito, still we look upon them as a collateral. We found that the tall, rank weeds were a roosting place, if I may use the expression for the mosquitoes, and when the scythes went through them you could see the mosquitoes coming out in flocks. We also found that when we cut the weeds it would give the wind an opportunity to get at the pools and they would be evaporated much sooner, and we got rid of a good many standing pools in that way.

Besides the eight gangs whose duty it was to clean up the premises we put a gang out oiling, which consisted of a foreman, two laborers and a cart. They carried the oil in the cart, and the laborers were supplied with a force pump and one of those sprinkling machines. This held about three or four gallons. This gang would go to the open pools and ditches (and around Mobile we have a large number of old batteries; they were there forty years ago, but have not been used for years, and have never been filled up) and they would spread the oil on the water that they found in those places.

The oil we used was crude petroleum mixed with kerosene. We found that the Beaumont oil was a little too heavy to spray properly, but when it was mixed with kerosene we found that it sprayed very well, and made a good surface over the water. We also used a by-product of wood tar, which is called "pyro-creosol" and found it to

be a good germicide when placed in the water. It spread out and made a sort of a milky colored mess.

We also used a good many barrels of permanganate of potassium. That was granted to some of the local physicians. Probably you all know that permanagnate of potassium is the basis of Condy's disinfecting fluid, and is of course a very good germicide.

I believe that is about the extent of our experience. We are still keeping up the fight, which has been successful so far, although we are peculiarly situated in Mobile. We have a large export trade with many southern ports—we have steamers coming from the Bocas del toro, and Port Lemon, and have as many opportunities of bringing the fever to us as perhaps any other place in the district.

THE PRESIDENT: Are there any other remarks on this question?

MR. POLLOCK: I would like to ask Mr. Rankine if he thinks the mosquito can fly any distance? Some of the mosquito experts seem to claim that it can fly over a mile.

MR. RANKINE: That depends on the mosquito, as I stated in my paper. Some species do not fly over two or three hundred feet, while others have been known to fly as far as fifty miles. That has been actually proved. The salt marsh mosquito is one of those that can fly a long distance.

MR. POLLOCK: Some people claim that they will not breed in the salt marshes.

MR. RANKINE: They do. Some of them will not breed any place else, and those salt marsh mosquitoes have been identified clearly, and are thoroughly known, and, to show you that they can fly, some of them have been found miles from a salt marsh.

MR. CRANDALL: I did not hear all Mr. Hazlehurst's address, but would like to know if any record has been kept of the cost of this campaign. I do not know if the matter was discussed, and if it has not I think it would be interesting to know what it cost.

MR. HAZLEHURST: In answer to Mr. Crandall's question, I would say that at the time I left our pay rolls were running about a thousand dollars a week, and our supplies were costing about three hundred and fifty dollars a week.

The crude oil that we use costs us six cents a gallon, the kerosene costs us eight cents a gallon. The permanganate of potassium was pretty steep. Two barrels of it cost $177.50.

I might say that Dr. Howard, the United States entomologist, says in his work on the mosquito that permanganate of potassium is of very little service, but still we rather listened to the pretensions of some of our doctors. They thought that it was a good thing, but I am not sure that it was of any real benefit, although it helped to run up our expense account pretty high.

MR. KENDRICK (Toronto): With reference to permanganate of potassium I may say this: Several years ago we were troubled with mosquitoes at the back part of our house, where there were trees, and where it was damp and shady all the time. My brother read somewhere that permanganate of potassium was a good thing for such a condition, and he bought a few pounds of it, which he dissolved in water and sprayed around. We had no mosquitoes that year, and we have had none since, for the spraying has been repeated once or twice since then. From this experience I am inclined to think that there is something in the doctor's prescription.

THE PRESIDENT: This discussion has certainly brought out the fact that the celebrated Eastern state has not a mortgage on the mosquito. It is my opinion that you will find mosquitoes everywhere, whether you go east or west. The worst crowd of them that I ever ran across in my life was up along the shore in Connecticut. I was rather inclined to be afraid of them there.

We will now hear a paper on "A Standard for Disinfectants," by Mr. William S. Crandall.

Mr. Crandall's paper was as follows:

A STANDARD FOR DISINFECTANTS.

BY WILLIAM S. CRANDALL, NEW YORK CITY.

It is four short years ago that mankind was busy rehearsing the miraculous achievements of the wonderful century that had just closed. Perhaps the greatest and most beneficial progress which has been made during the later past, was made along the lines of medical science, and that one of the most important of these lines has been that of sanitation.

The French philosopher, Boileau, declared, in speaking of honors heaped upon Napoleon, that men seem ever ready to give greater glory to their destroyers than to their benefactors. But today the benefactors of the race are having their turn, and the "medicine man" is regaining something of his old-time prestige. The applause of the multitude for the brilliant genius of Oyama and Togo and for the heroic fortitude of Stoeffel and Rojestvensky is equaled in sincerity by the generous appreciation of the sanitary measures enforced on the one side and the criticism of the unsanitary measures on the other side of the tremendous conflict in the far East.

The Japanese medical corps precede their army with dinisfectants instead of following with remedies, and fight bacilli with a strategy and a pugnacity equal to that with which the main army opposes the shells of the enemy. And when the final record of the war is written the doctors should be credited with a large measure of the glory of the victory, and the man behind the leather case should have equal honor with the man behind the gun. One of the greatest results of the Russo-Japanese war will be the rapid and scientific development of sanitation and the use of disinfectants throughout all countries.

At the very beginning of this increased use of disinfectants we are met by the fact that while a measureable proportion of human happiness depends upon their proper use, there is a great danger in their misuse. That disinfectants sufficiently potent to be advantageous are frequently dangerous tools in untrained hands, and hence, call for the enactment of stringent local laws, amounting to the practical prohibition of their sale except on evidence of a proper knowledge of their use.

It is a serious problem to solve, admitting the danger in the popular use of virulent poisons, and recognizing the opposing danger in their non-use, as to where to draw the line wisely. One case of infectious disease improperly cared for may become epidemic and involve a community.

The solution of the question requires a consideration for the public health balanced against accidents incident to public ignorance. The health of the masses is undoubtedly pre-eminent, and individual misuse, however deplorable its result may be at times, must be provided against by individual care. The ordinary friction match and the use of gas and kerosene oil are each almost, if not more destructive to property and life than the accidental poisoning from disinfectants.

The word "poison" is, however, a red flag of danger, and contains an element of indefinable dread. The man who just misses being smashed on the railroad, or drowned in trying to catch the ferry boat, does not give the incident a second thought, but tell him that common salt is poison and wherewithal will he ever again be salted.

The natural result is that in an effort to meet the demand for disinfectants, and yet comply with the law, the manufacturers place on the market harmless germicides which are usually as free of danger to bacterial life as they are to human life. Such preparations do possess one danger, however, in that they induce a sense of false security in the purchaser.

In this connection the difference between the disinfectants and deodorizers should be mentioned, for too often the public is misled to believe that the work of a true disinfectant is being performed by a deodorizer, when the truth may be that the latter is perfectly useless except as a destroyer of disagreeable odors. It is important to use and recommend for the purpose of sanitary disinfection exclusively those products which not only have the properties necessary to a deodorizer but also the more valuable and vital properties required of a disinfectant worthy the name.

Among the familiar sayings of the peoples of earth there are always to be found many in praise of truth, and whether we say: "A spade should be called a spade," or "Honesty is the best policy," or what not, a pharmaceutical preparation should invariably bear upon its face its name and its nature.

Every germicidal preparation should have an authorative value placed upon it by the government. The government is more and more regulating manufactured goods and has already prescribed some formulas in the drug line. But, at present, neither the federal nor the state governments make any provision for the standardization of disinfectants, and, there is, therefore, no accepted measuring stick by which the value of a germicide may be officially determined. The health officials of several states favor such action, but those of perhaps a majority of the states are indifferent to the subject. Though America is not behind other countries in action in this matter, we are far behind in the agitation that will generate such action, and we should bestir ourselves at once to establish some formula whereby the value of disinfectants which are sold in the market may be stated in known terms.

The argument in favor of this step may be briefly stated: That the state would under such conditions assume the practical control of the manufacture of each preparation placed on sale of an article of vital importance to the public health, and the efficiency of the article would be positively determined and the public protected against fraud.

What this standard should be must be determined by the chemists. Pure phenol has been recommended as the most practical for comparison by the eminent scientists who prepared the report to the Sanitary Institute Congress held in England in 1903, and bacteriological as well as chemical tests are proposed to determine the efficiency of the disinfectant.

This report suggests the following points to be considered in making the comparative tests: 1, time; 2, age of culture; 3, choice of medium—reaction of the same; 4, temperature of incubation; 5, temperature of medication; 6, variations in vital resistance of same species; 7, variations in vital resistance of different species; 8, proportion of culture to disinfectant.

It is admitted that this is a rather formidable series of comparisons, but it is stated in explanation that with pure phenol as the standard—the pure crystals of which contain from seven to eight per cent. of water—and, if standardizing a solution by means of bromide be regarded as too tedious a process, the bromo-phenol article will be found to answer the purpose

admirably, as 110 parts by weight of bromo-phenol carbolic acid contains 100 parts by weight of pure phenol. This disinfectant, too, has other marked advantages over any metallic salt or other standard, and no other standard could be chosen with which comparison could be made so readily and so satisfactorily.

The British Sanitary Institute has declared in this connection that there is no control in England over the sale of disinfectants except the permits relating to the sale of poisons. "The first of these permits the sale, without control, of liquids containing less than three per cent. of carbolic acid or its homologues as disinfectants on the ground that such fluid is not a poison within the meaning of the pharmacy act, and this has the direct effect obviously of placing a premium on inefficiency. * * * A bacterial rather than a chemical determination of efficiency is required, as, although the strength of a preparation of carbolic acid and its homologues can be ascertained with great accuracy, it is a well known fact that cyllin, for example, does not depend for its remarkable efficiency as a bactericide on the content of that acid. Again, much depends upon the conditions, both chemical and physical, in which the disinfectant is employed. * * * There is, therefore, a great need for a bacteriological test."

There seems to be a necessity, therefore, for some standard that must gauge the chemical and bacterial efficiency of disinfectants. The demand for such precaution has increased in rapid ratio year by year and will be constantly more imperative with the development of sanitary science and with the impulse given the subject by the revelation to the world of the possibilities along this line in the methods and practices of the Japanese medical corps.

The question of how best to attain the desired end is perhaps open to discussion on the point whether it should be left to the health boards of the several states or should be undertaken by the national government. The latter course is probably the better way. Between the states there is so much divergence in legislation even on identical questions, that if left to them there would likely be some forty-odd differing standards. The establishing of standards is an attribute of government, and, to avoid a heterogeneous list of tests the general government should exercise its function. The influence alone of the adoption of a standard by the army and navy departments would go far toward establishing a measure of effectiveness for germicides.

Should there be some regulation requiring all poisons to be put up in bottles of a special or peculiar shape, as is the case in some places in England, so that the sense of touch would warn of danger, it would be much safer to permit unrestricted use of really efficient disinfectants.

It is an oriental custom which employs the family doctor, by the year, to keep the family well, and stops his pay during cases of sickness. In our growing knowledge of sanitation we are adopting this "ounce of prevention" idea. The intelligent use of disinfectants is an essential element in this development, and we shall lack wisdom if we fail to appreciate it.

THE PRESIDENT: We have also a paper by Mr. J. M. Hazlehurst, of Mobile, Ala., on the subject of "Sanitary Engineering in the Southern States." I am pleased to call upon Mr. Hazlehurst to present his paper to the meeting.

Mr. Hazlehurst's paper was as follows:

SANITARY ENGINEERING IN THE SOUTHERN STATES.

BY J. N. HAZLEHURST.

Reminder of a civilization more remote than sacred or secular history; back into the very night of time; antedating that shadowy epoch of Sargon I, authenticated at 3750 years before the Christian era, and created possibly seven thousand years ago, now amid the crumbling and forgotten ruins of the dead City of Nippur has been found well preserved portions of an efficient drainage system.

Underneath the tiled pavements of the upper and more recent city, lie, properly jointed with bithulithic material, sections of burned clay pipe, constructed after the regulation bell-and-spiggot pattern, although of shorter length than the manufacture of today.

Beside these hoary relics and venerable ruins the ancient drainage of Jerusalem and that of the Cloaca Maxima, of Rome, are but creations of yesterday.

Yet despite these ghostly fragments of a long-forgotten past, it is but within a short fifty years that modern scientific effort has been directed toward the correct solution of problems effecting the sanitation of populous communities.

In the year 1880, a distinct and radical advance in the science of sanitary engineering was made when the late Col. George E. Waring advocated and demonstrated the advantage and efficiency of the separate system of sewers, predicted upon the divorcement of the domestic waste from storm-water run-off.

Financially unable to assume the enormous cost of constructing an adequate and comprehensive system of sewers of the combined type, yet smarting under the scourge of a most virulent epidemic of yellow fever, and determined to restore confidence and regain commercial prestige at whatever cost, the City of Memphis, Tennessee, pledged its credit to embark upon the then uncertain and hazardous engineering project of the construction of sewers intended to provide entirely for the disposal of sewage water carriage. Thus the South, amongst the first to ascribe to this new departure in sanitary engineering, succeeded in a practical demonstration of the soundness of these advanced theories, rested from her labors, and was for long content to point to Memphis alone as evidence of such progress.

With the phenomenal agricultural, commercial and industrial prosperity of the Southern States since the year 1890, came the pressing demand

for the improved and scientific sanitation of her cities, and many of these, commencing about that time, undertook the extension of existing and fragmentary systems of combined and separate sewers, or arranged for the construction of new works, amongst these being Richmond, Norfolk, Chattanooga, Nashville, Atlanta, Macon, Charleston, Jacksonville, Brunswick, Montgomery, Birmingham, and Houston; numerous of the smaller towns sooner or later following the good example of the more populous communities.

Of the larger municipalities of the South, Galveston and New Orleans alone remain unsewered, a condition which the latter city is at the present time actively and rapidly undertaking to remedy.

As compared with the progress and development of a majority of the other cities of the Union, those of the Southern section have been admittedly backward in this as well as in many other municipal improvements, and it is only fair to that section to recall to the hypercritical the fact that only within a comparatively short period have the cities below the Mason and Dixon line had the financial credit to undertake extensive public works, since following the desolation wrought by civil war, the more recent so-called reconstruction period with its baneful and unscrupulous legislation, dissipated revenues and pledged posterity unborn to the repayment of vast indebtedness from which no return was ever to be realized by these municipalities.

But with the passing of the shadow of those unhappy days, a more prosperous era has dawned and a new generation, fully alive to the demands of scientific attainment, determines to measure up to the highest standards of American civilization.

More than all others, perhaps, those of our profession insist upon results, and are impatient of excuses, hence with this brief defense of a situation for which the South is not directly responsible, we will proceed.

The Southern States, with increasing and diversified industries and development along all commercial lines, is still largely an agricultural country, comparatively sparcely populated and with its communities and centers somewhat widely scattered; therefore the necessity for sewage purification works has not to the present time been pressing, nor considered a necessary adjunct to sewerage systems. Purification plants, however, have been constructed and are in operation at Houston, Texas; Danville, Ky., and at Charlotte, N. C., the first being designed upon the broad-irrigation principle, while the two last follow the septic method, but neither of them are of especial interest requiring extended mention. The same may be said of the great majority of the sewer systems so far constructed in the South, none having been designed with notable departure from the current practice, except the works now being installed at New Orleans, and concerning which a brief outline may be of interest.

Situated at the mouth or delta of the Mississippi River and upon the shores of Lake Ponchartrain, topographical conditions about the city are such that a levee system is necessary for protection against the high waters, hence a gravity system of sewers becomes an impossibility.

In the general design of the New Orleans sanitary system, the engineer, Mr. George G. Earl, M. Am. Soc. C. E., has provided for the disposal of the sewage from collecting basins through the operation of three main and thirteen subsidiary pumping stations or lifts. The largest of these plants is designed to dispose of an ultimate flow of some eighty-two million gallon of sewage per 24 hours, discharging through a cast iron force main of 48-inch diameter into the river.

Following the usual practice, the unit of the system is the 8-inch vitrified sewer pipe, these laterals constituting 87 per cent. of the entire mileage. All pipe up to and including 36-inch are of vitrified clay, the larger mains up to the outfall of 6-foot diameter being constructed of brick or concrete, alternate proposals being received for the two materials upon each section of contract work let.

The general design of these sewers contemplates the ultimate construction of 900 miles of sewers of all sizes, while it is proposed to build at once some 400 miles, including the heavier sections. During the past two years more than 90 miles of sewers have been completed, about fifty miles of new work being advertised and let annually. At New Orleans, the Mississippi river passes with considerable current and immense volume even at the lowest stages of dry weather flow, and little apprehension of objectionable and delecterious pollution is entertained since calculations providing for a great increase in population, with allowance of 4 cubic feet of sewage per second per 1000 population, and to the extent of a daily discharge of 150 million gallons of sewage would show for solid matter, some one part in 86,000 by volume, and there passes during each minute of the day a volume of water equal to twice the amount of sewage proposed to be ultimately discharged in twenty-four hours.

The construction of these works offer many physical difficulties, owing to unstable soil conditions and its complete saturation at all points beneath the surface; an annual rainfall of more than 60 inches, generally confined to the summer months; the necessity for handling all seep water by pumping, and the almost certainty of encountering at any locality immense stumps of a virgin and extensive cypress forest long since buried from two to eight feet below the present surface of the ground. These natural obstacles and complicated with a most unsatisfactory labor situation have naturally been productive of high prices, the average for 8-inch pipe, with a depth of 6 to 8 feet, being about 90 cents per lineal foot of pipe furnished and laid.

In New Orleans, as in all of the Southern coastal cities, especial provision must be made to secure stable foundations and effective pipe-jointing, the latter being of primary importance to prevent overcharging the sewers through the infiltration of ground water and as well to provide against the influx of water-borne sand. Notwithstanding these precautions, liberal provision is always made for the entry of ground water, the allowance for that at New Orleans being assumed at some 26,000 gallons per mile of sewer, equivalent to a run-off of 0.003 cubic feet per second per acre.

Eighty gallons per day is the calculated per capita provision for household waste and 20 gallons for infiltration, the design of these sewers therefore being to provide for 100 gallons of sewage and ground water per capita of assumed population.

For the reasons given, the engineer responsible for secure foundations and a limited quantity of ground water must exercise especial care, both in actual construction and in the preparation of specifications governing such work. The following is an excerpt from a set of specifications drawn by the writer for sewer construction under such conditions:

"In soft ground, or where in the opinion of the engineer the soil is of such nature as to endanger the alignment of the sewer, lumber or other materials shall be placed as directed to secure a suitable foundation. Where quicksand is encountered, special foundations may be ordered by the engineer, but in general the construction at such spots shall consist of sound 2x12 inch planks, laid longitudinally, either with or without cross-stringers or sills, as may be ordered.

Along the foundation so prepared, the pipes shall be laid, wooden wedges being inserted under their barrels in such manner as to raise the bells clear of the foundations.

After jointing in the usual manner, a bandage or wrap of cheese cloth or similar approved material shall be tied about the connection in such manner as to fully protect the cement joint until after its initial set. The cost of such work shall be estimated at the price bid for the 'lumber in place.'"

With every public, as well as private enterprise of the South of today, the labor question has become almost significant, almost a dominant factor, and in view of its increasing importance its brief discussion here may not be out of place.

Of something more than eight million American negroes or persons of African descent, 90 per cent. reside in the Southern states and form almost entirely its laboring class, and seldom upon public works or elsewhere is the white man a competitor for strictly manual labor.

Without offering in comparison the economic value of the negro as a laborer in the past, all qualified observers agree that the colored individual of the present generation has deteriorated physically, and as a laborer is non-dependable and inefficient. Meanwhile the industrial expansion of the South has produced a labor demand which is neither being supplied by natural increase of the native population nor augmented by newly arriving aliens; hence in the South at the present time the labor situation is acute and is of such importance in connection with public improvements as to fairly merit this digression from the subject matter of this paper.

As evidence of irregularity and the non-dependability asserted, from the carefully analyzed statement of constructive operations over which the writer has had jurisdiction during a period of twelve months just passed, and where more than $10,000 has been paid in wages alone, exclusive of holidays or when work was impossible on account of weather conditions, the average of the actual time employed as contrasted with a

possible opportunity for work amounted to 59.6 per cent., or simply stated the negro laborer was willing to work at exceptional wages and preferred employment only a little more than one-half of his time for the twelve months. For the purposes of comparison with white labor, the writer secured information along these lines from a division engineer of the New York Rapid Transit Commission, who writes: "I find that taking fifty Italian laborers they made 17,608 hours out of a possible 20,000 hours, making 88 per cent full time."

On railroad work, which for many reasons offers peculiar attractions to the negro laborer, the same story of lack of continuity and indolence is reported as may be inferred from the following quotation from a late letter from one of the superintendents of the Southern railway:

"During the month we were obliged to employ 706 men to do the work which under other circumstances 340 men could have performed; in other words, the men instead of averaging twenty-six days per month, actually averaged about twelve days each."

Under the stress of circumstances the competition for labor in the South has led to a steady increase in wages, many cities paying from $1.50 to $2.00 for unskilled labor; $1.80 being the average for negro sewer men on contracts aggregating more than $200,000 in New Orleans and with which the writer was indirectly connected during the past year.

With white employees, an increase of wages is generally followed by a marked additional effort, but an advance in the negro's wage scale produces just the opposite effect, since he works only sufficient for actual maintenance, and augmented wages is followed by a direct and corresponding reduction of effort.

The improvidence and shiftlessness of the average negro in the South may be best illustrated from some such record as that shown by the Sexton's annual reports, which compiled for the past seven years shows that of the entire number of negro deaths in Mobile County, Alabama, for the average fiscal period, more than one-half have been buried as paupers at the public expense, and the extent of this economic loss may be understood when the fact is stated that about one-half the entire population of the county quoted, or something like 20,000 are persons of negro descent.

The recitation of these facts in connection with the labor situation at the South is but the concrete expression of distressing economic conditions only too familiar to all employers in that section of the country. From long and familiar associations with the colored individual and masses, the Southern white man has been willing to overlook the many weaknesses and failings of the negro laborer, but in the progress of the nation no longer can be postponed the realization of the industrial and economic incubus represented by the negro race at the present time, and there has arisen an imperative demand for more dependable labor in every vocation and in all fields of human endeavor.

In the South the natural increase is deficient both in numbers and quality, and it is now recognized generally that the only hope for a satis-

factory solution of the labor problem is through desirable immigration; its judicious selection, and proper distribution.

The questions of labor and immigration are of vital interest to any engineering or industrial proposition in the South, and the proper direction of immigration is one which must appeal to all sections of the United States; to all classes of its people but with particular force to those whose effort it is to secure a satisfactory labor for municipal improvements of the first magnitude, the writer will not further excuse himself for again digressing, and touching upon this somewhat alien subject. Under the haphazard policy of the United States permitting indiscriminate immigration of all nationalities except the Chinese, and relying upon a small class prescription as applied to individuals, with an absence of all effort to regulate or direct the influx of aliens, undesirable admissions and unnecessary congestion is a certain assumption.

As evidence of the inconsistency in the matter of distribution, from the reports of the Commissioner General of Immigration for the fiscal year, the ultimate destination of something more than four hundred thousand foreigners is given as being the two states of New York and Pennsylvania, while of nearly a million immigrants, North Carolina received 112, while South Carolina's quota was 95 new arrivals.

Conclusions are obvious although space permits no further amplification, but before concluding, incidentally it is suggested that the states of the Union should make careful study of the immigration laws of this great Dominion of Canada and learn a lesson from her proceedure and legislation governing immigration.

Her statutes are equitable, effective and admirable and while providing for the judicious selection and distribution of those who would cast their lot and identify their interests with this great commonwealth, offer every reasonable protection to the vested interest of her present citizenship while providing for the commercial, industrial and agricultural demands of her rapidly developing provinces.

This brief reference to Canada's immigration laws has not been made for the purpose of paying a deserved tribute to our hosts of today, but is incidental to the imperative necessity for a revision of our own immigration regulations to accord with great and pressing economic demands within our own boundaries and which must appeal to thoughtful individuals everywhere, but which should be of especial interest and enlist the active effort of such of us whose life-work in the direction of nature's forces to provide for the wants of man calls for the co-operation of brawn and muscle as well as the highly developed mental effort of human endeavor.

MR. HAZLEHURST: I wish to add that this paper does not cover the ground as I would like to have done, if I had the time at my disposal. I suppose I may blame myself, for I had sufficient notice to prepare the paper, but in excuse I might plead that the yellow fever and mosquitoes were bothering me some, and I postponed the

preparation of my paper, until finally I had to rush it through and was not able to secure all the data I wanted for the proper presentation of the subject. I offer this as an apology for the rambling way in which the paper reads.

THE PRESIDENT: I think the simplest way of answering Mr. Hazlehurst is to say that his excellent paper is now open for discussion.

THE SECRETARY: I was interested in Hr. Hazlehurst's reference to the work that has been done in Memphis, Tenn., inasmuch as some of the first engineering work that I ever did was in that city, in 1880, when Colonel Waring made his arrangements for constructing the sewerage system. I went there together with an engineering force from all parts of the country, and there was a surprising amount of work done there from the first of February till the first of June, 1880.

The system was what was then called, and is now, a separate system, and all the laterals were six inches instead of eight, as I understood Mr. Hazlehurst to say the system is now.

It has been found that the six inch pipes are too small, and it has been found necessary to construct manholes at different points along the line, which were left out entirely in the original plan.

We went there in February, 1880, directly after a yellow fever epidemic, which raged in 1878 and 1879, and there were a great many pools of water scattered all over the place, and we were sure that in each of those pools there were millions of yellow fever germs. Soon after we arrived we heard of two or three deaths that had occurred after the victim had been stung twenty-four or thirty-six hours previously. We were told that they were not cases of yellow fever, but we decided that it did not make any difference whether it was yellow fever or not; that what we had to do was to get that work done as quickly as possible, or a good many of us might never get out of the place.

The situation there at the time was such that the merest rumor as to a case of yellow fever was sufficient to scare us out of our boots, so to speak.

I remember one line of houses there, and in the rear of the lots three old cesspools were encountered within a distance of one hundred feet. They looked as if they had just been covered over and left there. You can imagine the result in such a climate as that. Such cases as that were not uncommon all over the city where we were working.

I think it is almost incredible that a city with 40,000 inhabitants, such as Memphis was at that time, should be able to get along without being wiped out entirely, owing to the climate and the lack of sewerage arrangements.

The result of the work at that time, as you all know, was very successful. They have had practically no yellow fever in Memphis since that time. The drainage water was kept out of the sewers as much as possible. The idea was to make a water-tight joint, and this was accomplished by pressing a gasket of oakum into the joint as far as it would go, and then filling the joint with neat cement. It was thoroughly satisfactory. Where there was much water tiles were laid alongside the main pipe so that as much of the subsurface water as possible would be carried off in that way.

Memphis was peculiarly laid out, because it had lanes running north and south and east and west, and the blocks divided up were equal to a city block, and they were divided up into four sections, so that when the sewers were constructed in all the streets and alleys (as they were in pretty nearly the whole city), the place was thoroughly covered with branches of the sewerage system, and it must have been quite effective, and those tile drains must have been effective in draining the subsoil. However, it is a clayey soil, so that they would not drain anything like as much area as in some of the Northern cities.

THE PRESIDENT: If there is no further discussion on this paper we will proceed to the next one, which is entitled "Sewage Disposal, an Experiment and an Experience," by Mr. W. H. V. Reimer, City Engineer, East Orange, N. J. If Mr. Reimer is prepared to read his paper, we would be glad to hear him.

MR. REIMER: In presenting this paper it is not the intention of the writer to go into the pros and cons of sewage disposal, or to in

any way condemn the use of disposal plants. We all know that local sewage disposal is of vital interest to all of our inland towns, and that such disposal is the only method which, as a rule, may be used, but if, through the experience which East Orange has had, other communities may be able to avoid the difficulties which swamped our plant and made us a nuisance to our neighbors, our object will have been in some measure attained.

SEWAGE DISPOSAL—AN EXPERIMENT AND AN EXPERIENCE.

BY W. H. V. REIMER, EAST ORANGE, N. J.

In the year 1880 the Township of East Orange (now a city), New Jersey, had a population of 8,300 and an area of four square miles. Two small hat factories comprised its manufactures. Its proximity to the large manufacturing and commercial City of Newark placed all mercantile ventures in jeopardy, and from centre to centre of city and township, but two and three-quarters miles intervened, while convenient transit was furnished by horse cars and steam railroad. It was a purely residential community, many of its inhabitants using it chiefly as a sleeping place at night, while attending to their business through the day in New York City—only ten miles away.

Its position as to drainage is on a divide which runs through and almost bisects its area on a line generally northwest and southeast, the northern slope being comparatively rapid, the southern slope very slight. Each slope is divided northeast and southwest by four parallel ridges and valleys which are more prominent near the central portion of the territory, but being very much reduced toward the northern and southern portions, the extreme northern portion being nearly seventy feet lower than the extreme southern portion.

The characteristics remain essentially the same today, as then, except that it now houses 26,000 people on its four square miles. Next to the City of Newark, its assessed valuation is larger than any other municipality in Essex County, of which it is a part.

In 1882 a water supply was furnished the township by an incorporated water company, and it soon became evident that wells and cesspools were doomed, the one as a source of supply, the other as a disposal of waste, and wise minds began to look about for a suitable plan of sewage disposal. The tide water, Passaic river, but little more than two miles away, was looked to with considerable interest, but the greater city lay between, with physical difficulties which appeared prohibitory, and local disposal seemed to be the only method which could be used. How little our wise men could see ahead will be shown later. Eminent engineers were consulted, plans for local disposal were prepared, and in 1886, four years after the water supply had been installed, a plan for sewers and sewage disposal was determined and adopted.

THE EXPERIMENT.

The plan provided for buildings in which settling tanks and proper machinery for handling sludge were to be placed, and about twenty acres of thoroughly drained land over which the treated sewage (after having been relieved of practically all solids by chemical precipitation) was to flow. The effluent from the under drains which ran into a large stream was expected to be pure water, and so, for a while it certainly was.

Two series of these settling tanks each were provided, and alternately one series to run about two weeks while the other series were being drawn off, the sludge gathered, strained and pressed.

THE EXPERIENCE.

It was expected by the engineer whose plan was adopted, that the expense of running the disposal works would be largely, if not entirely met by the sale of the pressed sludge for fertilizer. It took but a few weeks to demonstrate that the farmers of outlying townships were not only unwilling to pay for pressed sludge, but rather demanded pay for taking it away, and later, to refuse it altogether, because they satisfied themselves that its fertilizing value was almost nil. The result was that for the first three years the average annual cost of maintenance of the plant was $11,000.

Rosy reports were made each year of the increasing efficiency of the plant owing to better methods being introduced for the running of the plant, but each year the appropriations asked for the maintenance grew greater, the people in the immediate neighborhood insisted that objectionable odors could be noticed, and that under some conditions of atmosphere they were unbearable. Values of real estate dropped, and it became impossible to make real estate deals within the odorous radius; further, the neighboring townships through which the stream bearing the effluent sewage ran, found something wrong with the stream, protested vigorously and insisted that other means should be obtained to dispose of the sewage. In fact their insistence was so thorough that rather than face an injunction from the court preventing the use of the plant, the offending township was forced to seek other means of disposal.

Not only did the warning of the court force this conclusion, but it was duly reported to the citizens that at least $20,000 would be required for the coming year to run the plant with any degree of success and decency, with the prospect that each succeeding year would require increasing appropriations. Six years had gone by, and the plan of local disposal was condemned; $65,000 had been spent for the plant; $75,000 had been spent to maintain it. Money thrown away? Yes, but if the experience may prove beneficial to others, and that which proved disastrous to us may be an open path showing up the things to be avoided and the difficulties to be overcome, all has not been lost. Some communities might not be able to find some other method of disposal as we did, for in another two years, through the courtesy of the City of Newark, we were able to get a tide water outlet, and our troubles vanished in a night. It cost us $250,000 to

do it, but interest and sinking fund are not so much as the annual cost of maintenance. We are no longer a nuisance to our neighbors, or a menace to the health of our own citizens. Our disposal works grounds make a beautiful little park, developed and maintained by the county.

The question here arises, was the installation of this disposal plant an experiment? Engineering advice before it was built said no; the plan was all right. In England, France and Germany, such plants were working with success, and this should do its work also, but it did not do it, and I question whether you could find one out of a thousand among those who were familiar with it, who could be made to believe that the whole thing was but an experiment from beginning to end, and an experiment which ended in failure. I am not of that belief, but realize that some difficult features of the sewers were overlooked in the beginning, and sufficient care was not used to overcome these difficulties when they appeared.

Few people realize what it means to make from 1,700 to 2,600 tight sewer joints to the mile in shaky bottoms, or in ground where the sewer is laid below the general water level.

Just what might have been the result if some other method of disposal could not have been secured, of course is problematical as seen from this time, but to have been enjoined from the use of the plant would have placed nearly 20,000 people in jeopardy of their health, and probably have hindered the growth of the city beyond measure.

I believe that the main difficulty, and the one which it was almost impossible to overcome, after the sewers had been built, was the excess of ground water which found its way into the sewers, with the result that the disposal plant could not carry it.

I am satisfied that the sewage itself did not amount to half of that which was poured into the tanks, consequently the tanks could not hold their contents long enough to secure a thorough settling of the solids, and allow the chemical action necessary to purify the water before it left the tanks to overflow the ground. The result was that the overflow from the tanks was almost invariably foul, and the odor could be detected within a quarter of a mile of the disposal grounds providing the wind was from the grounds towards any given quarter.

I believe the plant would have been a success if three conditions looking thereto had been carried out.

Two of them were almost vital, the other largely helpful.

Of the two, the practical elimination of the ground water comes first, a metered water system second, and a thorough system of surface and storm water drainage to supplement the other two.

That the elimination of the ground water is vital, you all undoubtedly agree; that a metered water system would have largely reduced the waste sent into the sewers, we know from experience of other places where it is used, that it would largely reduce the waste, while a thorough drainage system would have reduced the ground water, and thereby reduced the amount which might find its way to any faulty joints.

That the ground water was the main difficulty is more apparent today than in the first years of the system, for today much of the ground through which the valley lines were run, has been drained to such an extent that the water furnished to the sewers is much less than formerly, and today with a population of 26,000, the main outlet is carrying scarcely ten per cent. more flow than when first put in use, at which time the population was about 16,000.

If to this reduced flow of ground water, there could be a still greater reduction by the use of meters, we would probably find that there would not be more than one and one-half millions of gallons of sewage per day to be disposed of. This amount could have been handled at the disposal plant with comparatively little difficulty, and as the amount normally increased, other land which had been acquired, but which had not been prepared, could have been put in use.

MR. CRANDALL: I did not quite catch whether the system in use was anything like that of the septic tank process so well known in England.

MR. REIMER: No, sir, it was not a septic tank. It was simply two sets of three tanks each. The sewage ran into one, and when that was filled it ran over the edge and filled the next one, and by the time it got to the third one it was supposed to be pretty thoroughly clarified. Then it was carried by little channels on to the ground and spread over it at different points. It was simply a sort of a filtration system. The idea was that the solids would precipitate themselves to the bottom of the tank and that all that flowed over the edge of the third tank was pretty clear.

THE PRESIDENT: Is there any further discussion on this paper? If not we will deal with Mr. F. W. Fitzpatrick's paper on "Buildings and Their Relation to Municipal Improvements." Mr. Fitzpatrick is not with us, but he has sent his paper. As the hour is getting somewhat late, I think we had better read it by title only, and incorporate it in the Proceedings.

Mr. Fitzpatrick's paper was as follows:

BUILDINGS—THEIR RELATION TO MUNICIPAL IMPROVEMENT.

BY F. W. FITZPATRICK, SECRETARY INTERNATIONAL SOCIETY OF BUILDING COMMISSIONERS.

Devise the most elaborate street plan you can, and let there be parks and boulevards galore; pave those streets as expensively as you wish;

install the finest water system known to engineering science, and let the sewerage, the lighting and all the "municipal improvements" be superlatively fine, yet without buildings what will your "city" be? Indeed, are not all those improvements but mere accessories, adjuncts, conveniences to the buildings And, according to the character, the importance, the utility and beauty of those buildings above all else, will your city be judged and assigned its place in the measurement of municipalities. Therefore, it is but just and meet that this convention of the American Society of Municipal Improvements devote some time to the consideration of that greatest of all municipal improvements—*buildings*. The only mistake the Society has made in the matter is in assigning a subject of such vast, o'ershadowing importance to one who, despite his keen appreciation of and his enthusiasm over it, can do the subject but such meagre justice.

At the very outset I may get myself into your bad graces by criticising the Society in that it has seemed, to me at least, to have fallen short of its high purpose by having comparatively neglected this main subject heretofore and devoted so much of its time and attention to the far less important matters of municipal improvements, franchises, public ownership, et cetera, et cetera, and I would exhort it with all the persuasiveness at my command to increase its efforts in that particular direction and strain its every energy to improve the conditions surrounding the very basic element of municipality.

Such effort would be timely. Other societies are awakening to a realization of the importance of the subject and the public generally seems to be getting into a more receptive frame of mind anent the matter. Some improvement may be noted all along the line. City after city shows at least a dawn of intelligence in the location of its own buildings and the citizens yield more gracefully to the rules set down for their guidance in erecting private buildings. The nation's capital has a commission of architects and artists (albeit unofficial and unpaid) to see to the artistic development of Washington; Cleveland has a similar commission that is doing splendid work; Chicago, Boston, St. Louis and other live cities have similar commissions under discussion. There was a time, and not so many years ago, when city hall, library or court house was planted down upon the lot whose owners or exploiters had the greatest political pull, regardless of the accessibility, centrality, or the harmonious blending of that building into a general scheme. Today most of our important cities, at least, are adopting something in the nature of a definite plan of development as to their buildings and in connection with parks, streets and the minor improvements. Architecturally, an integral part of the artistic development, a betterment is also perceptible. Look back fifteen or twenty years and you will find that public buildings, as a rule, were uglier by far than the ugliest of private efforts—and that is saying a great deal. Commissions were awarded architects through political influence, and mediocrity of design, if, indeed, those abortive attempts could be called designs, was the inevitable result. Today there is generally a competition fairly well managed and with competent judges, and if these or the municipal authori-

ties allow themselves to be prejudiced and should select something that ought not pass muster, the great public (formerly known as the "unwashed") has become so discriminating that the officers derelict to their duty generally receive such a dressing down that such awards are frequently "reconsidered." Yes, there is an improvement all along the line. But it is slow at best, and it behooves us who are so deeply interested and who, by reason of our membership in this very Society, have undertaken a certain responsibility toward the public, to redouble our efforts to better artistic conditions, improved though they be.

In the manner of construction has there also been some improvement? It is not so long ago that every individual felt that he had a perfect right to build as he wished, however perniciously his mode of building might effect his neighbor's property and the general welfare of his city. If he deemed it to his interests to build flimsy, "mere food for flames," he had a perfect right to do so legally. And it was about that time, too, that people laid sidewalks to suit themselves, of the material they wished, of the width they wished, and at the grade they particularly desired, so that you went up and down steps along the sidewalks of badly lighted streets, much to the discomfiture of gentlemen who had been attending night sessions of conventions or other such unbalancing functions. When cities began to regulate this matter of sidewalks, dictating of what material they should be, establishing uniform grades, and, indeed, doing the work to suit themselves and charging it up to the abutting property a howl went up against "interference" with private rights, the "liberty of the individual" was said to be assailed and it took time to make people realize that it was all for their own good. So with building regulations. When building codes first became the "fashion," much popular opposition was made to their passage. It was, indeed, an assailing of private rights, of individual liberty, paternalism running riot, an unwarranted interference with things which did not concern the municipality. Lately the public seems to have its eyes opened to the fact that good building is, in the long run, an economy to both city and individual, and it is only the Buddenseiks, the speculative builders, unprincipled rascals who build but for today in the hope of selling their whitened sepulchres to some unsuspecting innocent tomorrow, who oppose sane laws and throw obstacles in the way of their enforcement. Yet, unfortunately, these very men are a power, as we must perforce admit, because every wise law that is suggested certainly does meet with very violent though insidious opposition.

One of the greatest steps in real progress is the establishing of certain fire limits in cities and the compelling of every one building within those limits to do so in non-destructible construction. I say signs are hopeful, yet think of it, in all this great extent of the United States and Canada, there are scarce three thousand buildings that can be called even moderately fireproof, and fifteen hundred of those are congested in the city of Greater New York.

While I have the greatest sympathy with, and, indeed, work most zealously for the artistic development of our cities, I think we have per-

haps overworked the field at the expense of sound construction. Come with me through the residence streets of almost any city and we will see handsome residences and dainty cottages, very models of artistic daintiness, and so even with the great office buildings and municipal structures. They are pleasing to the eye, their proportions are artistic, the materials of the exteriors are expensive, and even the decorations of the interiors show refinement and a considerable development of apparently real art. But in nine cases out of ten these handsome fronts and decorative interiors are but a gloss, a veneer to very indifferent, if not inferior construction, a simulation of stability and permanance, and *real* improvement. Take any municipal or private building, your own homes for instance. Supposing your architect has planned a marble exterior, fireproof construction, the best of equipment and rather elaborate interior decoration. The bids come in and are away above the appropriation you have set aside for the building. Nine chances to one the first thing both you and the architects would think about cutting off would be the fireproof, permanent mode of construction, the next thing would be the saving in some of the vitals, possibly the plumbing or something of that kind, and the very last thing to be pared down will be the marble front. I tell you it's our national failing to love a good front and be not too inquiring as to what it covers up. In a building it savors much of the ridiculous, reminding one of an unlettered, unwashed savage gotten up in the habilments, the toggery of a gentlemen, in the hopes of deceiving us. And that very failing, that blindness to the real purpose of building, is what is costing us thousands of lives and millions of dollars every year.

Think of it. We throw away annually in fire four times as much as it would cost us to build every blessed thing that is erected throughout the country of uninflammable, imperishable materials.

Think, too, of all the municipal improvement, so called, that is made necessary by this folly of flimsy construction; improved water supplies, magnificent fire departments and what not, to protect us at least a little from the danger we have created and are adding to every day.

The question naturally arises at this point, "What is a good building, sound construction?" Let us spend a few minutes on the subject; it is well worth our time and attention. To begin with, the requirements naturally vary according to location. But let us set down as fundamental rules a few salient points. We know that wood burns; we know that granite, all stones, marble, slate, metals, concrete, glass and all plasters into which lime and sand enter as parts of the compositions, are very much damaged, if not destroyed by fire. Now then, since fire seems to be the most destructible element to which municipalities are exposed, it would seem meet and unreasonable to do everything possible to escape the ever-present danger and forestall the possibility of that danger continuing, ad infinitum, to threaten every community, every assemblage of buildings. The first thing to do, rationally, would seem to be to avoid the use of wood anywhere. It isn't a necessary material. There was a time when timber construction was an economy, indeed, the only thing available.

Those conditions no longer exist but we have gotten into the habit, it has become hereditary, and though wood is actually a luxury, we foolishly go on insisting upon the use of it. The next thing is, since we know that certain materials are damageable by fire, to avoid their use (or to protect them if they are used) in places where fire can affect them. The perfect building, the unassailable building, is one whose exterior is built of well burned brick, whose decorations are of similarly well burned moulded brick or terra cotta, whose roof is covered with asbestos, tile or cement; whose skeleton supports are of steel, amply protected by cement from corrosion and surrounded with fireproofing tile to guarantee their safety against fire; whose floors and partitions are built of fireproofing tile or brick; whose windows are of wired glass in metal or asbestos sash, protected again in its most vulnerable points with fireproof shutters; whose interior finish is of asbestos, some plastic composition, or metal, whose finished floors are of tile, marble, or cement, or rubber; whose decorations are plastic or chromatic; whose stairs and elevators are inclosed in tight fireproof partitions with automatically closing doors, making invulnerable shafts of the same and thus cutting off the flue-like induction that vertical openings offer to fire and its consequent rapid spread; whose furniture is largely of metal, glass or other non-inflammable material; whose carpets and hangings are reduced to the minimum and in whose entire devising the strictest attention is paid to its permanency, stability, and fireproof qualities. *That* is a picture of a really fireproof building, an ideal construction, one that is attainable, but, I grant you, a trifle more expensive than the ordinary construction of today. But really, it is the only form of building that should properly be called fireproof at all.

There is a very grave misconception in the public mind as to what *is* a fireproof building. All sorts of things masquerading under that name have been foisted upon the people, and naturally, those who have been once beguiled but have lost their property through fire, have become skeptical and to them nothing is fireproof, while to the man not yet initiated everything that is so labelled is blindly accepted as such. Well, taking this ideal structure as a standard, the thing to do is to approach as nearly as possible to it in every building, modifying its high requirements, however, acording to local conditions. For instance, if you are to erect a building in the center of a large lot, permanently away from everything else, then is the danger of external attack remote indeed and you are perfectly justified in using granite or marble, or the other damageable materials (but not the inflammable ones) upon its exterior. Or, if your building-to-be is surrounded by nothing but fireproof buildings, then, too, is external exposure minimized and latitude is justifiable. But if your building is in a dangerous neighborhood, surrounded by old ramshackle buildings, wholesale warehouses of flimsy construction and filled with inflammable materials, then are you justified in nothing less than the use of the best, fire-resisting materials. If your building is to be occupied by few people, highly intelligent and interested in the structure's welfare, and if there is to be no fire or cooking, or dangerous illuminating, then you may indulge

in considerable latitude in the interior and fittings, but those conditions are remote. Your greatest danger is generally from within and therefore should everything be done to minimize that danger to the utmost. Just so much as your exposure increases should your precautions be greater, and, inversely, may you depart from the most stringent requirements as those conditions become more favorable.

The fashion is to criticise conditions, to carp at what is being done, to call attention to our wrongs and to heap vituperation upon our wrong-doers. That is all well enough, but let us, a body of intelligent men, not be satisfied with this mere preliminary, this campaign of destruction, this going after the enemy, but let us, shoulder to shoulder, work for the elimination of what is wrong and the upbuilding of a system, the creating of conditions, a campaign of construction, a cure for the wrongs that we deplore, and let us map out now a program, a scheme of work, to bring about the happy consummation of these much-to-be-desired reforms.

No society that has been organized purely for the public weal has as splendid an opportunity or is so well equipped to point out the way to reform and to insist upon the betterment of conditions than the American Society of Municipal Improvements. We should join our forces to the other societies that have organized a campaign of education looking to the betterment of building. Publicity, everlasting hammering through the newspapers particularly, public discussion and such means, easily available to this Society, constitute the best ways of securing the desired end. Let us clamor for the strictest building regulations. They work no hardship upon honest men. Let those regulations be so stringent as to virtually bar the possibility of fire damaging the new buildings, and they should surround the old with such safeguards as to lessen their danger to the minimum and make their maintenance so expensive to the individual that, dull of comprehension as he may be, it will soon be evident to him that a good building is more profitable than a poor one. Forbid him to add stories to his old ramshackle, or wings of similar construction. If he is not willing to obliterate the danger that exists with him, at least prevent him from increasing that danger. Let the building regulations be such as to prohibit experimental construction with its resultant collapses and loss of life. Clearly prescribe the right way and as definitely prescribe the wrong way of construction. Insist upon the executive officers, the building inspectors, having due authority to enforce these regulations, then exert your personal and Society influence to see that the right men receive the appointments to these offices, men who will understand the regulations and enforce their every requirement without fear, or favor, or political bias. Give attention to the sanitary equipment of those buildings, do not limit your interest to the taking care of the sewerage when it leaves the building, start it properly. Advocate sensible limitations in the height of buildings. A man is justified in increasing his building to its greatest reasonable productibility, but do not permit him to make a chasm of your streets. Get together and try and have your cities adopt some uniform code of building regulations, the one offered by the International Society

of State and Municipal Building Commissioners and Inspectors, the advantages are legion. Harp upon the necessity of some intelligent and artistic general plan of your cities. It isn't necessary to start in tomorrow making beautiful parks here and there and spending millions in new public buildings but it is desirable to arrange a plan so that when a park is to be located or a building is to be erected it will merely occupy the place assigned it in that plan and will have some relation to the entity. Let all the efforts that are made, until the final consummation of the plan, be towards its completion. If a park is in question, keep buying the property, little by little, as it is for sale. And when appropriations are avilable for municipal buildings, jealously safeguard not only their construction, but their artistic excellence, position and conformity to the general scope and scheme of true municipal improvement. It is your duty as citizens and doubly so, being members of this Society, to devote considerable time and the greatest attention to all that concerns your city. Do not for one moment lose sight of the fact that we tried to establish at the outset of this perhaps too lengthy paper, that buildings constituted the largest part, the most prominent features of the municipality, and, therefore, deserve well of you.

One more thought, my lastly, gentlemen, and I will leave you to the consideration of perhaps more interesting papers, but certainly no more important subject. It is particularly fitting that I should mention this subject now and here, since the suggestion comes originally from Canada. You are much interested in taxation, in franchises, in the financial end of municipal business, hence is the matter of taxes upon buildings most pertinent. The municipality has the right to regulate, within certain well defined lines, its process and mode of taxation. It is to the municipalities' best interests that there should be no stagnation, no fossilization, no ruins and few relics within its borders. But what does it do towards eliminating or preventing these things? The municipality, without being philanthropic, must needs be socialistic. It exists by and for the people and not for the gain of the municipality as a governing body, or for any individual within it. Yet the whole system of municipal taxation could not be better devised were it planned to act as a drag, a deterrent to improvement. The more money you put into the betterment of any construction, or indeed the more business you do, the greater benefit you are to the municipality—and the more taxes you pay! In other words (and I quote my Canadian authority) "if a man taxes himself for the benefit of the public, it certainly is not fair to him to tax him again on the amount of his own taxation, but it would be quite fair to him and to everyone else to remit taxes to him on the basis of the account; and, inasmuch as taxes should be fluid and level up all hollows in the public estate, the displaced tax should find its settlement on buildings that are below proof in the matter of construction, fireproof and otherwise. It is for them and because of them that the costly fire department and water supplies have to be maintained, and they, and not the property which requires no protection, should pay for that maintenance." Would it not seem reasonable, therefore, to tax real estate

along some well planned line of values as to location? As improvements are made upon the property, reduce the taxation in the ratio of that improvement's advantage to the municipality. If a citizen insists upon building a three or four-story fire-trap apartment house and the municipality has not been wise enough to make laws to prevent him from doing so, his tenants, in spite of him, have to be very carefully protected by the municipality. The city has to pay for that protection; his percentage of taxation is now exceedingly small compared to the amount of protection his property receives. On the other hand, suppose a citizen who is as public-spirited as he is wide awake to his own interests, builds upon a similar piece of property a thoroughly well built, fireproof structure. It requires the very minimum of protection from the municipality and is of not the slightest danger to its environing buildings. That man is a distinct benefit to the city, his taxation should be the very lowest. In the course of years his building deteriorates but very little and the tax upon his building should remain level. The other man's property is deteriorating very rapidly and becomes a greater menace as every year goes by. He doesn't tear down the building and rebuild it properly. He is satisfied with the interest he is making upon his investment and as far as the city is concerned, and his tenants, why, they may be hanged or burned for all he cares. That man's tax, I contend, should be increasing year by year, for he is costing the city more every day that the structure remains as a menace. The question of ratios is not an insuperable one, and the plan is not only sane, but I also contend, eminently feasible, just and commendable, Utopian as many of you may think it, it would be a distinct, a great step in the all-comprehending progressive municipal scheme, and well worthy inclusion in the splendid program of endeavor of the American Society of Municipal Improvements.

THE PRESIDENT: We have another paper by Mr. E. J. Fort, on "The Organization and Conduct of a Bureau of Street Repairs for a City with a Population of 1,250,000." Mr. Fort is not with us, and I think we might just read his paper by title and print it in the Proceedings, then if there is any discussion, it can be held at the next meeting.

THE ORGANIZATION AND CONDUCT OF A BUREAU OF STREET REPAIRS FOR A CITY WITH A POPULATION OF 1,250,000.

BY E. J. FORT, ASST. ENGINEER, BUREAU OF SEWERS, BROOKLYN, N. Y.

Until very recently it has rarely been conceded by those in authority in American cities that street repairs is a proper field for the activities

of an engineer. Notwithstanding the fact that his profession deals primarily with the economic side of matters, and that modern education provides thorough instruction in economics, and notwithstanding also, that his experience makes him capable of handling men, a butcher or a grocer or a tradesman of almost any kind, is usually preferred, when a head of the bureau of street repairs is required. So nearly universally is this true, that I believe the discussion of the subject of street repairs by such a Society as this is unusual and may prove to be interesting and instructive for that reason, if not for others.

It is considered such a simple matter to repair roads and pavements that no particular skill is required, and the position of superintendent of this bureau with an appropriate salary attached to it is usually considered a perquisite of the victorious political party. This was more generally true before the days of improved pavements. It must be conceded that little skill was required and less was shown in laying the old time cobblestone pavement. It is not extravagant to say that if all the money set aside for this purpose had been wisely spent for the purposes for which it was designed and under expert supervision, our cities today might be not only well paved but well served with other public utilities which make the crowded life of great metropolitan districts possible and even pleasant.

The Borough of Brooklyn of the City of New York, to whose street repair organization this paper refers, is somewhat of an exception to the rule in the manner in which this department of the public service is managed.

In January, 1902, the present bureau of highways, which previously, under the Greater New York charter had been a branch of the department of highways controlled by a deputy commissioner of highways, was organized as one of several separate bureaus, under the jurisdiction of the borough president whose heads reported to the commissioner of public works. The bureau of highways was placed entirely under the control of civil engineers. The chief engineer having control of all matters relating to the construction and repair of pavements and all matters relating to the laying out, opening, closing and improving streets and roads, etc.

An assistant engineer was placed in charge of the division of repairs of this bureau and the whole service was entirely reorganized.

The Borough of Brooklyn covers an area of 77½ square miles. Somewhat more than one-third of this territory is closely built up and contains fully four-fifths of the total population. A large suburban area is quite fully improved but does not contain a dense population, while nearly two-fifths of the whole borough is almost totally unimproved, and contains a rather sparse population.

Street systems are not yet indicated on the ground, much of which is still used for truck farming. Nearly all of this has now been acquired by improvement companies that are rapidly making the improvements necessary to convert it into suburban homesites.

In January, 1902, there were

216.8	miles	of	cobblestone	pavements,
119.87	"	"	granite	"
95.14	"	"	asphalt	"
5.31	"	"	wooden block	"
82.15	"	"	macadam	"
47.39	"	"	belgian block	"

making a total of 566.66 miles of paved streets and roads. In the suburbs there were several hundred miles of unpaved roadways.

In January, 1905, the above mileage had changed to the following:

113.73	miles	of	cobblestone	pavements,
143.34	"	"	granite	"
211.59	"	"	asphalt	"
4.40	"	"	brick	"
43 16	"	"	belgian block	"
2.00	"	"	wooden block	"
96.16	"	"	macadam	"

Total, 614.38 miles.

Until 1901 the asphalt pavements were kept in repair by contract, as follows:

The various streets out of guarantee were grouped according to age and bids were submitted naming a price per square yard for the whole area in each group, for repairing and maintaining for one year. In 1900, the last year this method of keeping this pavement in repair was followed, the average cost to the city per square yard for repairs was 15.9 cents.

This method of calling for bids was thought to result in too great expense and in July, 1901, bids were called for naming a price per cubic foot for binder and wearing surface actually used in making repairs, and the reduction in cost to the city was so great that this method has since been followed.

In 1904 the prices bid for this material were:

Top.....85c per cubic foot.
Binder.....30c per cubic foot.

The average cost per square yard was 4.2 cents, a notable reduction from the former method.

It is probable that in 1905 there will be another reduction in the cost of asphalt repairs.

This contract is let in the winter and as soon as weather conditions are suitable in the spring the company which secures the contract commences work with a number of gangs of men (usually about 6) and usually within six weeks puts all asphalt pavements in repair. From that time throughout the season a few repair gangs are kept constantly at work going over the older pavements and repairing holes as they appear. The oldest pavements are sometimes repaired four times in a season.

Each repair gang usually consists of ten or twelve men, a foreman and a steam roller man. The number of trucks employed in hauling material to the street varies with the length of haul, but a gang of this size can usually lay 350 cubic feet of material per day, if the pavement is in ordinarily bad condition, and the distance over which the work is distributed is not too great.

An inspector for the city is present with each gang and marks with crayon the area of each patch to be cut out and measures the contents of each truck as it arrives on the work, takes its temperature, takes samples for analysis and otherwise supervise the laying of the material.

He makes a daily report to the office on a blank similar to the following one and a permanent record is made of the cost of repairs of each contract from year to year.

Report of Repairs to asphalt pavement on.....
between.....and.....on.....190

	Total Amount Laid	Laid between tracks and Two Feet Outside
Binder,	.....loads,.....cu. ft.;	.....cu. ft.
Wearing surface after cutting out,	.....loads,.....cu. ft.;	.....cu. ft.
Wearing surface after using burner,	.....loads,.....cu. ft.;	.....cu. ft.
Standard asphalt pavement,	.....sq. yds.;	.....sq. yds.
Concrete foundation,	.....cu. yds.;	.....cu. yds.
Temperature of asphalt, highest,.....lowest,.....		

Remarks .....
.....
.....Inspector.

All openings made by plumbers and others are repaired by the same contractor at a price per square yard for the asphalt and per cubic yard for the concrete foundation.

These repairs are paid for from a fund accumulated from the regular charges for such openings—$13.00 for openings of less than 5 square yards, and $1.25 per square yard for all in excess of this. An inspector carefully measures all of these openings and makes the proper reports to the officer, from which the contractor is paid.

All openings made in pavements under guarantee are repaired by the contractor who laid the original pavement at the price bid for this pavement.

It should be said that the money spent for asphalt repairs represents the amount necessary to keep the asphalt pavements in good repair and not as is so often the case the amount the city can afford to spend or the officials are willing to appropriate for the purpose. All asphalt pavements are kept in good repair. Of course in the spring after months of weather which is unsuitable for laying asphalt some of the older asphalt pavements are badly out of repair, but during the remainder of the season this is not the case.

It may be of interest to note here that during 1904, asphalt pavements

1 year	out of	guarantee	cost	00.0c	per	square	yard	for	repairs,	
2 years	"	"	"	2.8	"	"	"	"	"	
3 "	"	"	"	1.6	"	"	"	"	"	
4 "	"	"	"	4.9	"	"	"	"	"	
5 "	"	"	"	3.5	"	"	"	"	"	
6 "	"	"	"	5.2	"	"	"	"	"	
7 "	"	"	"	4.3	"	"	"	"	"	
8 "	"	"	"	10.1	"	"	"	"	"	
9 "	"	"	"	4.0	"	"	"	"	"	
10 "	"	"	"	9.9	"	"	"	"	"	
11 "	"	"	"	13.6	"	"	"	"	"	
12 "	"	"	"	19.0	"	"	"	"	"	

All other pavements out of guarantee are repaired by men employed by the city who are organized into gangs of suitable size, and provided with the necessary tools and materials.

In the built-up portion of the borough where nearly all of the pavements except macadam are laid, the repair force during the summer months consists of five large gangs of men containing each

1 Foreman,	at	$4.00	per	day.
4 Pavers,	"	4.96	"	"
2 Rammers,	"	3.84	"	"
13 Laborers,	"	2.00	"	"
4 Horses and carts,	"	3.50	"	"
1 Horse and wagon,	"	3.75	"	"
1 Team and truck,	"	5.00	"	"
Total.....		$80.27		

Two small gangs of men containing each

1 Foreman,	at	$4.00	per	day.
2 Pavers,	"	4.96	"	"
1 Rammer,	"	3.84	"	"
6 Laborers,	"	2.00	"	"
3 Horses and carts,	"	3.50	"	"
1 Horse and wagon,	"	3.75	"	"
Total.....		$44.01		

One street cleaning gang containing

1 Foreman,	at	$4.00	per	day.
6 Laborers,	"	2.00	"	"
5 Teams and trucks,	"	5.00	"	"
1 Horse and wagon,	"	3.75	"	"
Total.....		$44.75		

Nine sidewalk repair gangs containing each

1 Flagger and curbsetter,	at $4.50	per day.
1 Helper,	" 2.00	" "
1 Horse and wagon,	" 3.75	" "
Total.....	$10.25	

In addition to the above force one gang of men is constantly employed with concrete mixer laying cement sidewalks and concrete foundations for pavements. This gang consists of

1 Foreman,	at $4.00	per day.
8 to 25 Laborers,	" 2.00	" "
6 to 10 Teams and trucks,	" 5.00	" "
3 Cement workers,	" 2.50	" "
Total.....	$57.50 to $161.50,	

depending upon the character of the work.

There are also six connection gangs containing each

1 Foreman,	at $4.00	per day.
1 Paver,	" 4.96	" "
1 Rammer,	" 3.84	" "
3 Laborers,	" 2.00	" "
1 Horse and wagon,	" 3.75	" "
Total.....	$22.55	

There are also

3 Assistant foreman,	at $4.50	per day.
6 Watchmen,	" 2.00	" "
1 General foreman,	" 5.00	" "

who supervises repair work in the whole borough.

There are six corporation yards in this portion of the city where material, such as paving blocks, sand, broken stone, cement, paving pitch and tools and machines are stored for the use and convenience of these repair gangs. A watchman is stationed at each of these yards who keeps account of all material received and sent to each gang. He also keeps an account of all tools stored at the yard and charges each foreman with tools furnished to his gang. These tools must all be accounted for at the end of the season's work.

The book kept by the watchman is as follows:

BUREAU OF HIGHWAYS. Borough of Brooklyn, City of New York.

..... *190*

FOREMAN'S RECORD OF MATERIAL RECEIVED at Corporation Yard at....., ...190

From Whom Received	Material	For What Purpose	Quantity	Condition—Quality	Remarks
					Foreman

The large repair gangs are engaged almost entirely in relaying block pavements that have become so badly out of repair that they cannot be put in good condition without relaying entirely. It has been found that a gang proportioned in this way works to the best advantage at this class of work. The average width of roadway is about 32 feet, and 4 pavers have plenty of room to work without interference. Two rammers are able to ram and otherwise adjust all the blocks that four pavers can lay. Of the 13 laborers, four are usually employed in barring out and removing the old blocks, three or four men are employed in carrying blocks to the pavers and the remainder in picking and grading the earth foundation.

The repair gangs having two pavers are employed in making small repairs in block pavements. Where a pavement is in fair condition, having only here and there a hole or depression, or where only a small portion of the pavement must be relaid to put the street in good condition, a gang of this size can be employed to the best advantage because a larger one would be scattered so much that the foreman could not have proper control over all the men. The connection gangs are employed in restoring the pavement over openings made in block pavements for the purpose of making water, sewer, gas and electric connections. They also repair all dangerous holes reported to the office. Not all of the connection openings are restored in this way. The gas and electric companies are allowed to restore much of the pavement removed by them for this purpose and no charge except for inspection is made by the city for the privilege of making the openings.

A district comprising about one-sixth of the paved area of the borough is allotted to each connection foreman and his work is confined to that district almost exclusively.

Each paver is required to pave as a day's work

45 square yards of granite blocks, or
45 square yards of Belgian blocks, or
60 square yards of cobblestone pavement.

There is very little brick pavement in the borough and the wooden block and the greater portion of the asphalt block pavement is still under guarantee, so that the amount required for a day's work is not fixed.

The foreman makes a written report upon the following blank each day, giving the force employed, the amount of work done and the materials used:

.....190 **Foreman's Daily Report.**

BUREAU OF HIGHWAYS, BOROUGH OF BROOKLYN

Room 19, Municipal Building.

Connections Paved or Repaired Street Repairs Sunken Connections, etc.

No. of Permit	Date of Permit	KIND	LOCATION	CLASS	LOCATION	Sq. Yds Paved	Loads of Sand	Loads of Stone
					..... *Foreman.*			

This information is recorded in the office and the cost per square yard is figured as soon as the work is finished. Every foreman is thus kept in competition with every other foreman and expensive work is detected at once.

The area of pavement removed for a connection opening averages about 4.2 square yards. The connection gangs are required to move from place to place so constantly in their work that they are not able to restore as much pavement as if this were not the case. The average day's work for one of these gangs is ten openings, or about 42 square yards of pavement.

The method followed in making and restoring these openings is as follows:

The plumber obtains the necessary permit for making the connection from the proper department and pays the regular fee. He then obtains a permit from the bureau of highways to open the pavement and pays the fee required for restoring it. This money, as it accumulates, is kept as a separate fund and is spent for the wages of the men employed to restore the pavement. A report is made to the bureau of highways after each connection opening is made by the department, or bureau which granted the original permit. Ten days after the opening is made an order to repave it is given to the foreman in whose district it happens to be.

This method of procedure has been so well systematized that not more than two or three openings out of 12,000 per year fail of being repaired

promptly. The foreman returns the list of connection openings paved each day in his daily report. A permanent record is then made of the location of the opening, the date when made and when repaired, by whom made, etc.

Reports are made daily by the departments of police and street cleaning of all holes in the pavement, dangerous or otherwise, which have been found by employes of these departments and they are given to foremen of connection gangs to repair. These foremen communicate with the office every day by telephone at a given hour for the purpose of receiving notice of such holes and for other purposes. Several thousands of holes are repaired in this way each year. It is customary to repair them within 24 hours from the time they are received at the office. They occur in great numbers over all trenches and connection openings. More than 100 are commonly reported after a heavy storm.

During the winter months all of the repair gangs are laid off and the connection gangs are doubled in number. They are employed in making temporary repairs to dangerous holes, sprinkling sand on icy walks and pavements, cleaning snow and ice from walks in front of city property, cleaning suburban roads after storms, providing surface drainage as far as possible where no sewers have been built and doing a multitude of things for which they seem to be most available.

The street cleaning gang follows the repair gang and after an interval of 15 days from the time repairs are made, cleans away the sand with which the newly laid pavement has been covered.

Up to the present time almost all the pavements laid with a concrete foundation are so new that only slight repairs are necessary. The repair gangs therefore are engaged almost entirely with the old granite block, Belgian block and cobblestone pavements. The present organization of the gang need not be greatly changed, however, when these old pavements are entirely replaced, as we may reasonably predict that they will be in a few years.

The flaggers are employed in making repairs to curb, crosswalks and flagging. They make daily reports to the office and are held to strict account for the quantity and quality of work which they do.

During the winter months a small stone crusher is operated at one of the corporation yards and a good supply of broken stone for concrete foundations for pavements and sidewalks is at hand in the spring.

The cost of crushing this stone has been about 60 cents per cubic yard. Contractors are required to deliver free of charge at the nearest corporation yard any old material required by the city. A large quantity of second hand blocks, bridging and cobblestone is in this way usually hauled to these yards for use in repairs and for crushing.

In a few years when the old pavements have been entirely replaced this crusher will no longer be of use.

In 1903 a little more than 30,000 square yards of granite block pavement on a concrete foundation was laid by the repair force in place of old cobble pavement which was removed. The cobblestones were hauled to the crusher and crushed and used in the concrete foundation. The granite used came from nearby streets that were being paved with asphalt and

was delivered by the contractor without cost to the city. Sand was delivered on the street by contract at a price per cubic yard. The cost of this work was $2.10 per square yard. When new blocks were used this cost was $3.54 per square yard. The average cost of such work done by contract in the same year was $3.56 per square yard. Some work of this kind was done the following season, but usually the saving over the results obtained by contract, if there is any, is so small and the appropriations for contract work have been so liberal that it has seemed wiser to expend all money appropriated for repairs proper and not for repaving.

It should be mentioned, in comparing the cost of this work when done by contract and when done by day's labor, that the contractor pays $1.50 for ten hours' labor, while the city pays $2.00 for eight hours' labor. Then, too, the contractor chooses his own men, while the engineer in charge of such work takes the men, teams, etc., that are sent to him without discretion.

The city buys its material, such as cement, sand, etc., by contract frequently when the market is unfavorable, while the contractor buys at his convenience when the market is favorable, and can almost invariably obtain lower prices.

The difference in these items should be sufficient for a handsome profit to the contractor.

In the suburban portion of the borough the repair force consists of

(A.) Four gangs of men containing each

1 Foreman,	at	$4.00	per day.
8 Laborers,	"	2.00	" "
1 Horse and wagon,	"	3.75	" "
4 Horses and carts,	"	3.50	" "
2 Teams and trucks,	"	5.00	" "
Total.....		$47.50	

(B.) Two gangs of men containing each

1 Foreman,	at	$4.00	per day.
10 Laborers,	"	2.00	" "
1 Horse and wagon,	"	3.75	" "
4 Teams and trucks,	"	5.00	" "
4 Horses and carts,	"	3.50	" "
Total.....		$61.75	

(C.) Three gangs of men containing each

1 Foreman,	at	$4.00	per day.
12 Laborers,	"	2.00	" "
1 Horse and wagon,	"	3.75	" "
3 Horses and carts,	"	3.50	" "
1 Steam roller engineer,	"	3.50	" "
1 Team and sprinkling cart,	"	5.00	" "
Total.....		$50.75	

(D.) 1 Assistant foreman, at $3.00 per day.
22 Teams with sprinkling carts, " 5.00 " "

Total.....$113.00

One assistant general foreman at $4.50 per day has immediate supervision of this suburban force.

The four repair gangs first mentioned are employed entirely in repairing dirt roads and are provided with an ordinary blade road machine. This machine is hauled by two teams, and, when the soil is free from stone and tough sod, should be able to repair 1,000 feet of roadway per day. The laborers are then only required to make what small repairs the machine neglects, clean and grade the gutters and to dispose of sod and other debris. Much of the work of these gangs, however, is filling holes and washouts and doing small jobs of grading when the machine is of no use, so that the average amount of roadway repaired per day is much less than 1,000 feet.

The two gangs designated (B) are employed in cleaning macadam pavements. They are each provided with an A. B. C. macadam scraper and a street sweeping machine. The lineal feet of roadway one of these gangs clean per day depends entirely upon its condition and the width of roadway, the length of haul for the sweepings, etc., so that no fixed amount constitutes a day's work. In the most remote and unfrequented portions of the borough the macadam pavements are not cleaned more than twice per season. In the best part of the suburbs they are cleaned once per week. Where the roadway is provided with a curb they are swept and cleaned much as any other pavement is cleaned, but where no curb is set the grass and weeds are cut up with a road machine and the gutter is graded only.

The three gangs designated (C) are employed each with a steam roller in making repairs to macadam pavements. The macadam roads—the only paved highways in the suburbs were many of them paved several years ago with limestone and as they become quite thoroughly worn out they are resurfaced with trap rock. Contracts are let each winter for this material at a price per cubic yard delivered on the street. This price for the last few seasons has averaged about $1.65 per cubic yard; 27,900 cubic yards 1½ broken stone and screenings were bought for this work in 1905, which it is thought will repave about 11 miles of roadway. A gang organized as above should finish at most about 500 square yards per day. The gang usually works about as follows: Five or six men are required to spread stone, two (2) men with horse and cart each are required to spread screenings, and the remaining men and horses and carts are required to clean and prepare the roadway to receive the stone. The cost of this work is usually about 9 cents per square yard per inch in depth of finished work. This compares very favorably in price with the results obtained by contract and the quality of the pavement obtained is fully as good as can be obtained in any other way, so that the policy of the bureau of owning its

own steam rollers and doing its own macadam repair work has proved to be a complete success.

Eighteen sprinkling carts owned by the bureau and under the supervision of an assistant foreman are employed in sprinkling macadam roads. Only a part of these roads, the most frequent thoroughfares and those in the most closely built up districts can be sprinkled by this number of carts.

A certain length of roadway is allotted to each sprinkling cart and the driver is held responsible for the condition of this roadway. It is considered that one cart is able to sprinkle properly about two miles of roadway 15 or 18 feet in width, if hydrants are located at points convenient to the work. In a working day of 8 hours one cart should deliver at least 35 loads of water of 600 gallons each upon the street. If the team walks at a reasonable speed, one cart load should cover about 600 feet. In those portions of the suburbs that are highly improved the roadways are much wider than 18 feet and must be sprinkled several times per day in order to lay the dust completely. This sprinkling is continued for about 200 days per season. Outside of the comfort afforded the residents, who otherwise would be very unhappy and uncomfortable, because of the dust, it is undobutedly of great benefit to the pavements themselves, as they would ravel and deteriorate rapidly from traffic were they not sprinkled.

The foreman in charge of this work is provided with a bicycle and visits each sprinkling wagon at least twice each day.

The general foreman, who, under the direction of the assistant engineer in charge of street repairs, has charge of all of the repair force, is provided with a horse and carriage and spends all of his time practically supervising the work in the streets. He is able to visit every gang of men about every two days.

Each assistant general foreman has charge (under the general foreman) of repairs in a certain district. He is supposed to be thoroughly familiar with the condition of the pavement on every street in his district, and is held responsible for the amount and character of work done by repair gangs in that district. It is his duty also to locate and repair promptly all defects in the pavement that have escaped the attention of the police and street cleaners.

The assistant engineer in charge is provided with a small automobile and chaffeur to care for it. This machine has proved to be more efficient and economical than horses for this work and more of them will no doubt be introduced in other departments for work requiring much travel.

Weekly, quarterly and yearly reports are made to the chief engineer and by him to the commissioner of public works of the operations of this division of the bureau.

Including the fund accumulated from charges for plumbers and corporation openings, the amount annually appropriated for labor maintenance and supplies for the bureau of highways is about $485,000. The large part of this (about $360,000) is spent for the purpose of street repairs.

A few years ago when cobblestones formed the great majority of all the pavements, this sum was entirely insufficient to keep them in repair.

Where traffic was heavy they could not be made to stay in repair any length of time and almost any amount of money could be spent in the effort to put them in good condition. Recent large bond issues by the city for repaving have nearly transformed the borough from one of the worst paved cities in the world to one of the best, and have enabled the bureau with this appropriation to put the remaining old pavements in good condition.

The problem of street repairs would be greatly simplified if the pavements were not constantly torn up by corporations for the purpose of laying gas mains and connections, electric light, and telephone conduits, repaving street car tracks and cables and by contractors for the purpose of laying water mains and sewers; by plumbers for the purpose of making water, sewer and gas connections and by others for almost every conceivable purpose.

In 1904, 78,272 connection openings of all kinds and 37 miles of trenches for water mains alone were opened in the paved streets.

The length of trenches opened by gas companies, sewer contractors, electric and other companies is not exactly known, but it was very large.

These trenches and openings are seldom properly tamped when they are refilled and invariably settle enough to destroy the smooth surface of the pavement, and no matter how carefully the repairs are made the pavement is never as good as it was originally. After a few trenches have been dug through it, it must be entirely relaid to restore it to its former condition.

Legitimate wear from the wheels of vehicles and the feet of horses is not in most cases the greatest factor in the destruction of a good pavement.

The day when all or nearly all subsurface structures in the borough or the city may be placed in conduits built for that purpose seems far off and the subsurface of the streets bid fair to become more and more closely occupied by such structures until, as at present in some parts of Manhattan, it is a difficult problem to find room for more.

Its value in use is the only true measure of the worth of a pavement. This value depends nearly as much upon the state of repair in which it is kept as upon the manner in which it is built. It is certainly less expensive to keep pavements in good than in poor condition and their life will be much longer.

Few things improve the general appearance of a city more and give a better general impression than nicely paved streets.

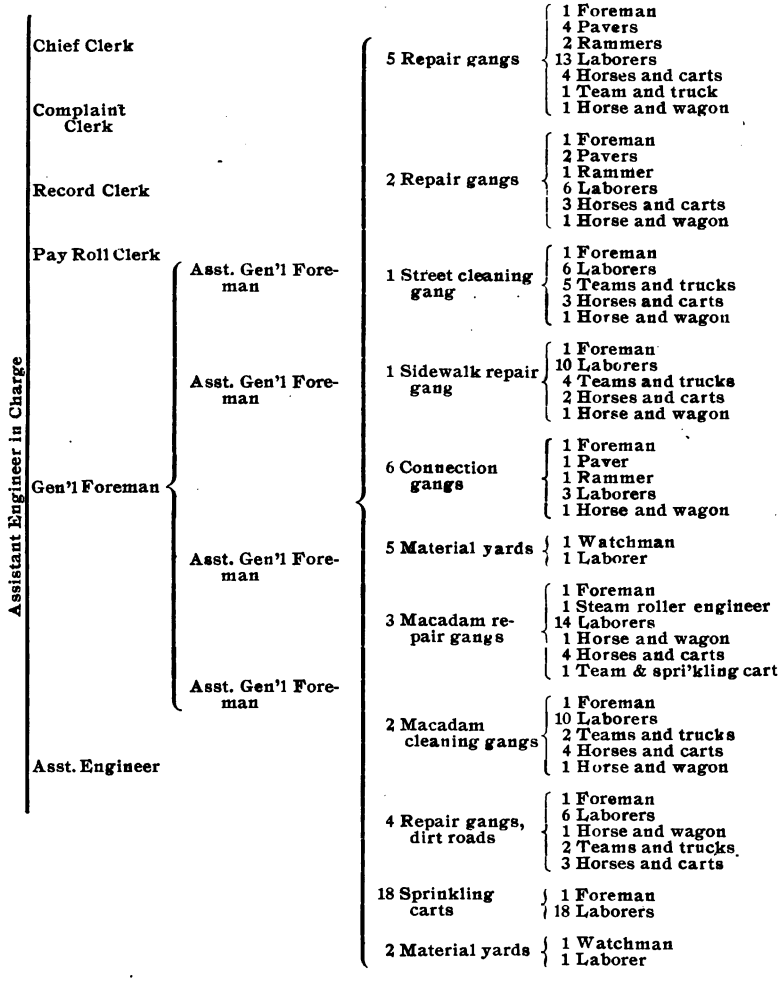
The condition of the pavement is something of an index to the character of the people. It has a direct bearing upon their physical, mental and moral welfare. It is noticeable that after a new clean pavement has been laid, people are more careful of their personal appearance and the children become more addicted to the use of soap and water.

As in other undertakings, good work implies good organization. The laying of a modern pavement requires some skill and this skill is acquired only by experience.

A system of civil service which insures reasonably continuous employment is therefore necessary.

If every man is given a living interest in his work and made to feel the importance of it, the question of organization is easily solved.

The organization below is not submitted as an example of a perfect one or one that would be suitable for all cities of this size. It is no doubt capable of improvement, but it has proven sufficient for its purpose in Brooklyn and its members quite generally feel that their occupation is a desirable one and that they are doing an essential and important part in providing the modern utilities and wholesome surroundings that science decrees to be necessary to preserve the intellectual and physical stamina of the race as the movement of population toward the cities steadily increases.



Total force when recruited to its full strength and including all men assigned special work and not shown above about 500.

THE PRESIDENT: With becoming modesty Mr. Chausse has left his paper for last. He wishes me to apologize for him not being able to read it personally on account of his voice being out of trim this evening. This being the case, perhaps we can excuse him, and I will read his paper to you.

The President then read Mr. Chausse's paper, as follows:

OUR SINFUL EXTRAVAGANCE—THE NEED OF STRICTER BUILDING REGULATIONS.

BY ALCIDE CHAUSSE, MONTREAL.

Architect and Building Inspector of Montreal, and Vice-President International Society of Building Inspectors.

This North America of ours is vast indeed; our natural resources are great, and we have grown to look upon them as inexhaustible. With ruthless abandon we have devastated our forests; we have worked our lands beyond endurance; our mines, our fields are handled without regard for the morrow. Within but a few years our economists have called our attention to this useless waste, and indeed we find ourselves confronted by a scarcity of certain commodities hitherto thought unlimited. People are just beginning to awaken to the true condition of things.

But of all the useless wastes that we, as a people, have indulged in, in the United States and in Canada, that of fire—our annual bonfire—is the most inane, in fact criminal, for by it is property not only devastated but lives by thousands yearly sacrificed.

Think of it! In 1904, 7,000 people were burned, an average of 19 fatalities through fire every day in the year, and a record that nearly equals that of all the railroad accidents of the two countries, generally considered the most fruitful source by far of fatal accidents. And the record of 1904 was not an extraordinary one, the increase in deaths by fire has been growing steadily. Our present ratio is about nine lives lost by fire every year for every one hundred thousand of population. In 1900 the ratio was eight, and in 1890 it was five. Unless something drastic be done, what will be the ratio in 1950

If the loss of life is appalling, the loss of property is disgusting. One hates to think that he is part and parcel of such a race of stpuids. Not even China and Japan, with their paper and bamboo houses, submit to such a tax as we do. Our fire losses are equal to a tax of $25 per year per family, and that tax shows but the loss of property actually consumed. We have burned up one thousand million dollars worth in six years. Most losses, so called, are really but exchanges; one product turned into some

other form; a loss perhaps to many, but a gain to some. Not so with fire. That loss is final, absolute, and the visual one is actual. The only gain to anyone is an indirect one to the insurance companies who profit just so much more by the added anxiety after a fire that people have to be insured, and the insurance business is not run upon strictly philanthropic lines. The result of the transformation caused by fire is nothing but smoke—$230,000,000 worth of smoke last year. As with last year's death record the property loss does not show a spasmodic increase or something very extraordinary and unlikely to happen again. Even including the Baltimore fire it was but little over the regular increase, a record that has been climbing ever upward—a record that hovered about the 60 million figure in the '70's, the 100 million in the '80.'s, and one that has not been under the 160 million limit since 1900.

And, mark you, that is the destruction of property. Along with that we throw away $150,000,000 or so additional in maintaining and perfecting water plants and fire departments, salves to assauge the pain of the sore, not a cure for the malady. Then, on top of that we go to work and gamble with the fire insurance companies and pay out countless millions more, so that they will reimburse us individually should we suffer a loss through fire.

For every dollar that the individual loser receives as indemnity, the community has paid out three dollars as insurance premiums. That is the average. I have in mind one city that has paid out in a given time $692,000 in premiums, and that has gotten back $107,000 for its losses by fire during the same period. An intelligent speculation to be sure, but then, what gambling is intelligent?

But leaving aside the accessories so to speak, and restricting ourselves to the actual destruction of property, the $230,000,000 of last year means a daily average of $630,000. Now, large as that is, we were satisfied some time ago that it did not tell all the story. We draw those facts from the fire department records, insurance reports, etc., more or less fallible sources of information, and that are far from being all-comprehending. We were sure that there were hundreds of fires unreported in interior districts of uninsured property, and where there were no fire departments. So, early in February of this year, the Society of Building Commissioners and Inspectors prepared a most elaborate system albeit expensive, to get all the facts concerning fire for at least a short period. The system was in working order by February 19, and was, I am sure, perfect on the 23rd.

During the ten days of the test, from February 19 to 28, there were 1,315 fires, totalling a loss of $14,809,000, or one and a half million dollars a day. True, it so happened that there were some pretty severe fires during that period, but, who tells us that there will not be as severe, or more severe ones later on during the year as there was previous to that time?

Granted that the record of a million and a half a day will not obtain the year round, and assuming indeed that we will not actually average more than half the amount, still the figure is exceedingly near the mark reached by the new buildings we are daily erecting and that give such a

semblance of progress, indeed a boom. At the most liberal estimate we build but a million dollars worth of buildings a day, hence we are destroying perilously near as much as we are creating. Talk of race suicide!

New York averages 8,700 fires a year; Chicago 4,100. We burn up three theaters, three public halls, twelve churches, ten schools, two hospitals, two asylums, two colleges, six apartment houses, three department stores, two jails, twenty-six hotels, one hundred and forty flat houses, and nearly sixteen hundred homes every week of the year. We may say that every person who lives or has business in buildings is more or less exposed to danger by fire, owing to our recklessness or criminal carelessness or ignorance, but setting aside such broad terms we have estimates that there are 36,000 lives daily in danger, that is, there are that many people directly exposed to fire—people who escape from burning buildings—lives that are in imminent peril. No war, however bloody, shows any such average of lives daily exposed to destruction.

And what is being done to prevent this terrible loss? A little—almost hopelessly little in the way of prevention, though much as a palliative. We throw water upon our fires (we are constantly endeavoring to throw it more scientifically) and expect the next fire to burn less fiercely because thereof. In San Francisco, for instance, there is little being done comparatively to improve the standard of construction. It is notoriously a wooden city, yet insurance rates are fairly low, because, forsooth, the *fire department is so excellent.* That is like extolling the advantages of a certain locality as a health resort. It may be miasmatic, yellow fever may stalk amuck; its houses and streets may be foul, but, glory be, its doctors are skillful.

As far as cure goes, note how little we have done. In all this broad land there are but three thousand buildings that can be called "fireproof," and that very largely only in their structural parts, that is, fireproof buildings like those in Baltimore, whose steel frames and terra cotta floors withstood the attack where all else about them, the stones, the marble, the wood, went the way of all things combustible or destructible.

What is the cure? But two things will tend toward the accomplishment of that end, and neither water supply nor fire department is one of them. The first thing to do is to surround our old and dangerous buildings with safeguards, to correct their worst faults where practicable, and to compel their demolition as soon as possible. The second is to absolutely bar the erection of combustible structures in the future.

Some would say that that would be a hardship upon the individual, for we have grown so accustomed to using wood that it seems to be a fixed mode of construction, sanctioned by time and custom, a sacred inheritance, any tampering with which must needs savor of sacrilege. Therein the folly.

There was a time when wood construction was true economy, indeed the only thing available. Today wood is almost a luxury. Lumber has gone up so much in price (over 150 per cent. in the last few years), while the fireproof materials, brick, steel, fireproofing tile, cement, etc., have

been cheapened in cost of manufacture. There is absolutely no economy in building even a simple cottage of wood. Granted that the first cost in the fireproof material is 10 per cent. more than wood, but consider the wear and tear, the maintenance, the insurance and all those incidentals, and your frame cottage will have cost you in twenty years' time 30 per cent. more than a well built non-inflammable structure would have done.

The deterioration in the value of a well built fireproof building, fire resisting in its finish and decoration is but one-ninth of 1 per cent. a year, while that of the ordinary wood joists and stud partition affair is nearly 4 per cent. a year. Besides such improved construction has a host of other advantages. Sound proof, vermin proof, warmer in winter and cooler in summer, and in every respect superior to the old way of building.

Some weak hearted ones would have us believe that to bring about those two conditions would involve superhuman effort, well nigh an impossibility. But, our cities have accomplished other reforms quite as revolutionary, so thought at the time, as this would seem to be. The people sometimes chafe at what they term the restrain of individual liberty, involved in the enforcement of drastic curative laws. But not for long. North American intelligence is such as to soon recognize the value of perhaps individual sacrifice involved in a great public benefit. We may not hope, however, to bring the desired conditions about by mild persuasion, preaching. It will take vigorous action, and the only action that will accomplish anything is the adoption of most stringent building regulations, and their strict enforcement by competent executive officers.

Building in general terms requires the clearest definition and restriction, while every class of building calls for a thoughtful and comprehensive special legislation. If we think that theater builders ought to enjoy certain latitude, we have but to scan the record of the Iroquois theater. If it be suggested that dock sheds are hardly worthy of special legislation, think of what happened at New Orleans. If wholesale warehouses be deemed unimportant, note what happened in Toronto. And so it is with every class of building. Nothing can be deemed unimportant, for that very building or class of buildings, may prove the ruin of half your city.

Strict building regulations, I say, are all important and supremely necessary. Two hundred and sixty-four of our American and Canadian cities have realized that, for there either have been, or are being adopted perfected building regulations in that many cities. One hundred and sixteen cities or considerable towns heretofore unprovided with a special building officer or department have the creation of such office under consideration. There are happy indices of betterment, however we may look, thank Heaven, but it is just such societies as this, made up of thinking, public spirited men, zealous in the upbuilding of their several municipalities that can do a world of good in facilitating this work, and bringing its consummation about even in our own times.

Of all the cities that have given most thought and earnest work to this matter, Cleveland easily takes the lead. Her building ordinance may

be said to be the combined work of nearly all the building experts in the country. A vast sum was spent upon its preparation, every item was discussed by experts and its effect upon the legal side of the question as well as the technical were carefully weighed by specialists, and the society of which I am an officer, the International Society of Building Commissioners and Inspectors, has virtually advocated that ordinance in toto as its model and standard, and is urging every city in both countries to adopt it also with as little change as possible.

Some may think it verbose. It is complete, and leaves nothing to the misinterpretation or misjudgment of a perhaps too lax officer. Every point is covered.

I submit, and you will readily appreciate that it would be a tremedous advantage to have a uniform code throughout both countries. As it is now one city will permit of a certain thickness of brick walls to carry a certain height of stories; a city fifteen miles distant therefrom insists upon an entirely different standard. So it is with allowable strains in framing, etc. The building business of all the cities in so closely related that this everlasting difference is not only confusing but leads to endless discussion and trouble. A hundred other considerations should compel us to advocate not only good building regulations, but uniform ones, and I sincerely trust that each one of you gentlemen will not only advocate in his own city the necessity of wise and strict requirements, but that he will go a step farther and strongly urge the council, or whatever power is in charge of that branch of municipal service, to adopt the code that is most worthy of being made standard, and that has already been engrossed upon the laws of so many of the cities of these United States and Canada.

THE PRESIDENT: This completes the "literary" portion of the evening. There is still some little business to be transacted, and then we are through.

MR. SHERRERD: Mr. Phillips was obliged to leave town today, but there were some questions that we wished to ask in connection with street paving. I will ask the privilege of referring those questions to the Committee on Street Pavements, and they can be discussed at the next meeting.

THE SECRETARY: I would move, Mr. President, that the thanks of this Society be tendered to the following persons and companies for the manner in which they have provided for our entertainment, and the care they have taken of us while we have been here:

The Mayor and members of the City Council.
The members of the Fire and Light Committees.
The Montreal Street Railway Company.

The Canadian Pacific Railway Company.
The Montreal Terminal Railway Company.
McGill University.
The Bell Telephone Company.
Mr. George Gauvreau, of Theatre National.
The Sparrow Theater and Amusement Co.
The Chateau de Ramezay Committee.
Rev. Abbe Thoie of Notre Dame.
Prof. J. C. Dussault, organist of Notre Dame.
Mr. Levi Tremblay of Riverside Park.
Mr. Joseph Langlois of St. Helen's Island Ferry.
The Canadian Municipal Journal.
The Municipal News.
Municipal Journal and Engineer of New York.
The newspapers of Montreal.
The readers of papers who are not members of our Society.
Harbor Commissioners of Montreal.
Canadian Society of Civil Engineers.
Ladies of Montreal on Reception Committee.
Engineers' Club of Montreal.

THE PRESIDENT: I think that Mr. Chausse and Mr. Barlow deserve a special word of thanks from this Society for the trouble they have taken in connection with making a success of this meeting.

MR. O'BRIEN: I agree entirely with our President, and if he will make a motion that the special thanks of the Society be extended to Mr. Chausse and Mr. Barlow, I will second it with pleasure.

THE PRESIDENT: Mr. Chausse and Mr. Barlow, it has been regularly moved and seconded that the special thanks of this Society be extended to you for the work you have done during the past year, particularly in arranging the details of this meeting, the success of which is due almost entirely to you.

MR. CHAUSSE: I am somewhat taken by surprise by this, Mr. President. As you know I am not much of a speech maker, but I thank you very much for your kind words. I only tried to do as I promised you at St. Louis last year. You will remember that I told you if you came to Montreal we would try to increase the membership and give you a rather good time. If I have been able

to help in doing either of those things, I feel amply repaid for any trouble I have taken.

I thank you, gentlemen.

MR. BARLOW: I have not anything to add to what Mr. Chausse has said. He has done most of the work, and, I think, is entitled to most of the thanks. The part that Mr. Barlow took in it was comparatively small. I thank you for your kind words, however, and assure you that if it ever happens that I have an opportunity again (and I hope it will) you will find me ready and willing to do what I can to make the meetings as great a success as this one has been.

MR. SLATTERY: Coming as I do from Newfoundland, and this being the first convention of this nature that I have attended, I have been very much interested in the proceedings.

A great many new matters have been brought to my notice here, and I have collected a great deal of information which will prove most valuable to me, and I shall go home very much enlightened on many points.

But that was not why I stood up to speak, gentlemen. What I wish to do is to propose a hearty vote of thanks to our President for the able manner in which he has directed these proceedings from the opening up till the present moment.

This motion being duly seconded, was carried, amid applause.

THE PRESIDENT: I thank you very much, gentlemen, for your expression of good will, although I do not see that I have done anything particular to deserve it. The task of directing a meeting like this is a pretty easy one, seeing that the members are so willing to be directed.

As there is no other business before us I will now declare the Twelfth Annual Convention of this Society closed.

THE EXHIBITION

For the first time in 1905 an attempt was made to have an exhibition of municipal supplies which should supplement the usual technical meeting. The exhibition was held in the Crystal Rink and a large display was made from many sections of the country. The exhibits were not as well examined as they deserved, as the time of the Convention when not engaged in meeting was given to the matters which had been planned by the local committees. But enough was seen to demonstrate that the effort was a success and that it can easily be made a prominent feature of future meetings, when specific times should be set apart for examining the different exhibits.

The entire matter of future exhibitions has been placed in the hands of a special committee appointed by the President for this purpose.

The following were the exhibitors present:

American Asphaltum & Rubber Co., 721-3 Woman's Temple, Chicago, Ill.	"Pioneer" Mineral Rubber Pipe Coating. "Pioneer" Waterproof Asphalt. "Pioneer" Asphalt Filler. "Pioneer" Paving Asphalt. "Wasatch" Mastic.
William H. Arthur, Stamford, Conn.	Repressed vitrified brick blocks for "T" rails.
C. L. Berger & Sons, 37 Williams St., Boston, Mass.	Precise Engineering and Surveying Instruments.
The Blair Light Co., Northboro, Mass.	Automatic High Candle Power Lamp.
Buff & Buff Mfg. Co., Jamaica Plain Station, Boston, Mass.	Precise Engineering Instruments.
Canadian Fire Hose Co., 14 St. Sacrament St., Montreal, Can.	Underwriter's Fire Extinguishers.
Canadian Fairbanks Co., Ltd., Montreal, Toronto, Vancouver, Winnipeg.	Hydrant, Valves and Waterworks Supplies.

The Construction & Paving Co., Ltd., Toronto, Ontario.	Pavements, Sewerage, Waterworks and General Contractor.
Jules Colas, 6 St. Denis St., Montreal, Can.	New Drainage Well.
Godson Constructing Co., City Hall Square, Toronto, Can.	Railroad, Waterworks and Sewer Construction.
The Goold, Shapeley & Muir Co., Ltd., Brantford, Can.	The "Ideal" Concrete Mixer.
Kolesch & Co., 138 Fulton Street, New York City.	Surveying Instruments.
McAvoy Vitrified Brick Co., German-American Bldg., Philadelphia Works, Perkiomen Junction, Pa.	Shale Paving Brick and Blocks.
The John McDougall Caledonian Iron Works Co., Montreal, Can.	Pumps, Water Wheels, Water Meters, etc.
The Metropolitan Brick Co., Canton, Ohio.	Metropolitan Paving Blocks.
The Montreal Pipe Foundry Co., Ltd., Montreal, Can.	Cast Iron Water Pipes.
The James Morrison Brass Mfg. Co., 85 Adelaide St., West, Toronto, Can.	Brass valves and all kinds of brass goods.
T. A. Morrison, 204 St. James Street, Montreal, Can.	
Municipal Journal Publishing Co., 140 Nassau Street, New York City.	
Neptune Meter Co., 120 Liberty Street, New York City.	Trident Disc and Crest Water Meters, all sizes.
Northern Electric and Mfg. Co., Ltd., 371 Aqueduct St., Montreal, Can.	All kinds of electrical instruments and fire alarm apparatus.
The Ontario Asphalt Block Co., Windsor, Ontario.	Asphalt Paving Blocks.
Pittsburg Filter Mfg. Co., Farmers' Bank Building, Pittsburg, Pa.	Gravity Filters, Pressure Filters, Water Softening Plants.
F. H. Pough, 28 Burling Slip, New York City.	Pozite, pipe joint cement for wet trenches.
The Sawyer & Massey Co., Ltd., Hamilton, Ontario.	Rock Crushers, Road Graders, Steam and Horse Road Rollers and General Road Machinery.
The Sayer Electric Co., 14 Beaver Hall Hill, Montreal, Can.	General Electrical Fixtures.

The Sessions Foundry Co., Bristol, Conn.	Manholes, Sewer Traps and all kinds of Municipal Castings.
Sicily Asphaltum Paving Co., 43 and 45 Prince St., Montreal, Can.	Asphalt and Granite Pavements and Carboron Cold Water Proofing.
The Thomson Meter Co., 83 Washington Street, Brooklyn, N. Y.	Water Meters of all sizes.
Frederick Todd, Montreal, Can.	Landscape Architect.
U. S. Wood Preserving Co., 29 Broadway, New York City.	Creo-resinate Wood Pavements.
Warren Bros. Co., 93 Federal Street, Boston, Mass.	Bitulithic Pavements.
The Waterous Engine Works Co., Ltd., Brantford, Can..	Fire Engine for Cities and Villages.
The Wilkinson Plough Co., Toronto, Can.	Dumping Wagons, Scrapers, Ploughs, Road Planers, etc.
R. D. Wood & Co., 400 Chestnut Street, Philadelphia, Pa.	Constructers of Gas and Water Works. Mathews' Hydrants, Gates, Check Valves, Cast Iron Pipe, Pumping Engines, etc.

INDEX.

	PAGE.
ADDRESS:	
Chas. Chaput	21
C. H. Cattelli	20
Inaugural of President Folwell	26
Mayor Laporte	19
Reply of President Folwell	22
BY-LAWS	11
COMMITTEES:	
Executive	3
Finance	3
Nominating, appointment of	33
Report of	172
Place of Meeting, appointment of	33
Report of majority	170
Report of minority	171
Special	5
Standing	4
COMMITTEE REPORTS:	
Electric Street Lighting	160
Finance	101
Municipal Data and Statistics	36
Review	106
Sewerage and Sanitation	213
Street Paving	121
CONSTITUTION	7
ELECTION OF:	
Delegates to Illinois University	35
Members	26
Officers	173
EXHIBITION	273
LETTER OF:	
Chas. Warren Hunt	17
MEMBERS:	
Election of	26
List of	12
OFFICERS:	
Election of	173
List of	3

PAPERS: PAGE.
"A STANDARD FOR DISINFECTANTS." By William S. Crandall..... 230
"BUILDINGS, THEIR RELATION TO MUNICIPAL IMPROVEMENTS." By F. W. Fitzpatrick 245
"COST OF COLLECTION AND DISPOSAL OF GARBAGE." By B. E. Briggs 147
"FIRE ALARM TELEGRAPH, ORIGIN AND ADVANCEMENT." By James Ferns 187
"GUTTERS AND CROSSWALKS." By W. J. Stewart..... 132
"HISTORY AND DESCRIPTION OF MONTREAL WATERWORKS." By George Janin 190
"INCINERATION AND CREMATION OF MUNICIPAL WASTE." By Howard G. Bayles 149
"LEGISLATIVE FUNCTIONS UNDER THE WHITE CHARTER." By Thomas Neville 88
"LEGISLATIVE FUNCTIONS OF GREATER NEW YORK." By Milo R. Maltbie 94
"MONTREAL'S CIVIC ASPHALT PLANT." By John R. Barlow..... 185
"MONTREAL, PAST AND PRESENT." By R. Stanley Weir..... 174
"MUNICIPAL ACCOUNTING REFORM." By H. W. Wilmot..... 45
"MUNICIPAL FRANCHISES." By James Owen..... 55
"MUNICIPAL FRANCHISES." By John R. Barlow..... 66
"MUNICIPAL PARKS." By John N. McClintock..... 102
"ORGANIZATION AND CONDUCT OF A BUREAU OF STREET REPAIRS FOR A CITY OF 1,250,000." By E. J. Fort..... 252
"OUR SINFUL EXTRAVAGANCE, THE NEED OF STRICTER BUILDING REGULATIONS." By Alcide Chausse..... 266
"PAVEMENTS AND PAVING MATERIALS." By J. W. Howard..... 137
"PURIFICATION OF WATER BY COPPER SULPHATES." By Daniel D. Jackson 202
"REVIEW OF MUNICIPAL WORK." By T. Chalkley Hatton..... 114
"SANITARY ENGINEERING IN THE SOUTHERN STATES." By J. N. Hazelhurst 234
"SEWERAGE DISPOSAL, AN EXPERIMENT AND AN EXPERIENCE." By W. H. V. Reimer..... 242
"THEORY AND PRACTICE OF ASSESSMENTS FOR LOCAL IMPROVEMENTS." By N. P. Lewis..... 81
"USE OF OIL ON MACADAM ROADS." By T. F. White..... 123
"WHAT MAY BE THE TREND OF PARK DEVELOPMENT." By G. A. Parker 97

REPORTS OF:
Secretary 30
Treasurer 31

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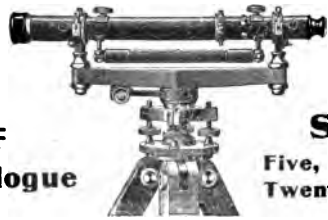

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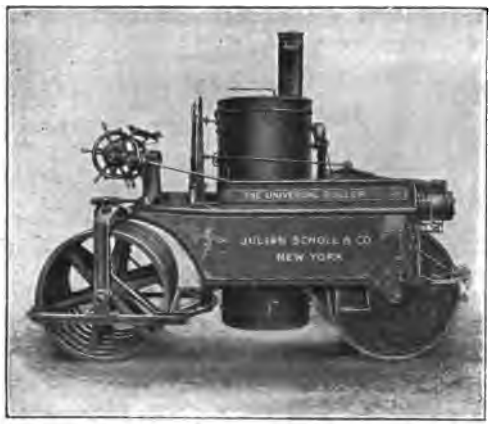

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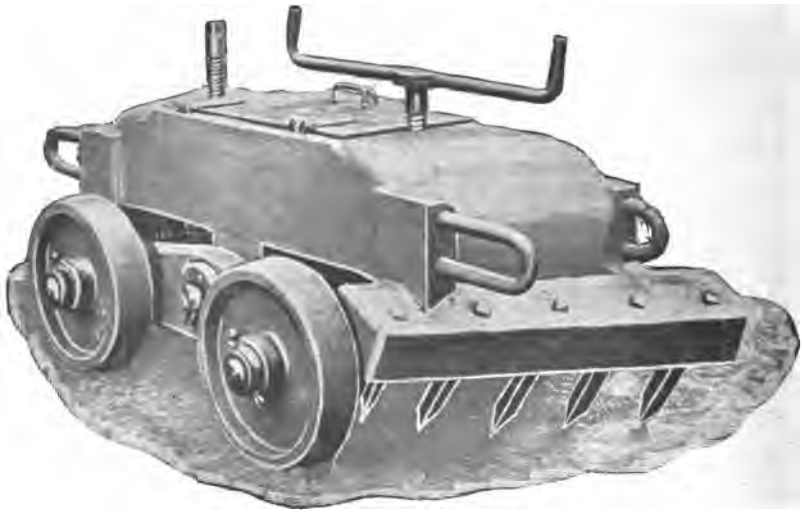

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